EXHIBIT 31

IN RE NATIONAL PRESCRIPTION OPIATE LITIGATION **Track Eight:** *Cobb County v. Purdue Pharma, et al*	MDL No. 2804 CASE NO. 1:18-OP-45817-DAP

EXPERT REPORT OF

CRAIG J. MCCANN, PH.D., CFA

January 24, 2024

PLAINTIFF TRIAL EXHIBIT
P-01355

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I. Qualifications and Remuneration

A. Qualifications

1. I am the President of SLCG Economic Consulting, LLC, successor in business of Securities Litigation and Consulting Group, Inc. ("SLCG"). SLCG was founded in 2000 to apply finance, economics, statistics and mathematics in litigation and consulting. SLCG staff includes professionals with PhDs and advanced degrees in applied mathematics, statistics, finance and economics.

2. Prior to founding SLCG, I was a Director at LECG, a business unit of Navigant Consulting, Inc. Prior to joining LECG, I was Managing Director, Securities Litigation at KPMG LLP. I was a senior financial economist in the Office of Economic Analysis at the U.S. Securities and Exchange Commission (the "SEC") from 1992 to 1993 and from 1994 to 1995.

3. I have taught graduate economics and finance courses at the University of South Carolina, Virginia Tech, Georgetown University and at the University of Maryland, College Park.

4. I have been hired as a consultant and expert witness in investigations by many state and federal agencies including the SEC, the Federal Deposit Insurance Corporation and the U.S. Department of Justice.

5. My work as a consultant and expert witness over the past 30 years has required me to extract or receive data, process and validate the data and produce varied statistical analyses.

6. I earned a Ph.D. in Economics from the University of California, at Los Angeles. My graduate studies included extensive coursework in mathematics, statistics and econometrics.

7. My resume, which includes a list of all publications authored by me within the last 10 years and the cases in which I have testified as an expert at trial or by deposition within the last four years, is attached as Appendix 1.

8. I previously provided expert testimony on substantially the same issues discussed below through written reports and depositions in *In Re National Prescription Opiate Litigation* more fully identified in my resume.

B. Remuneration

9. SLCG is being compensated for its time and expenses. My hourly rate is $475 per hour. Other SLCG personnel working on this matter have billing rates of $100 to $395 per hour.

II. Materials Considered

10. In preparing this report, I have considered the following documents:

a. Automation of Reports and Consolidated Orders System ("ARCOS") electronic data, received from the Drug Enforcement Administration (hereafter, "ARCOS Data");

b. "ARCOS Retail Drug Summary Reports," Drug Enforcement Administration, 1997-2022, (available at www.deadiversion.usdoj.gov/arcos/retail_drug_summary/arcos-drug-summary-reports.html);

c. "National Drug Code Dictionary," Drug Enforcement Administration, November 2018, January 2020, and August 2023 (current version available at www.deadiversion.usdoj.gov/arcos/ndc/ndcfile.txt);

d. "NDC Dictionary Instructions," Drug Enforcement Administration, October 2010 (current version available at www.deadiversion.usdoj.gov/arcos/ndc/readme.txt);

e. "NDC/NHRIC Labeler Codes," U.S. Food & Drug Administration, January 2018 and August 2023 (current version available at www.fda.gov/ForIndustry/DataStandards/StructuredProductLabeling/ucm191017.htm);

f. "Opioid Oral Morphine Milligram Equivalent (MME) Conversion Factors," Centers for Disease Control and Prevention, August 2017 (https://www.hhs.gov/guidance/sites/default/files/hhs-guidance-documents/Opioid%20Morphine%20EQ%20Conversion%20Factors%20%28vFeb%202018%29.pdf);

g. "Full Replacement Monthly NPI File," Centers for Medicare and Medicaid Services, December 2019 (current version available at download.cms.gov/nppes/NPI_Files.html);

h. ARCOS Registrant Handbook, Drug Enforcement Administration, August 1997 (current version available at https://web.archive.org/web/20161224182937/https://www.deadiversion.usdoj.gov/arcos/handbook/full.pdf);

i. Masters Pharmaceutical, Inc. v. Drug Enforcement Administration, 861 F.3d 206 (D.C. Cir. 2017);

j. U.S. Dep't of Justice, DEA, Chemical Handler's Manual: A Guide to Chemical Control Regulations (2004), (WAGMDL00395965);

k. U.S. Dep't of Justice, DEA, *Diversion Investigators Manual* (1990) (CAH_MDL_PRIORPROD_DEA07_01176247);

l. U.S. Dep't of Justice, DEA, *Diversion Investigators Manual* (1996) (CAH_MDL2804_02203353);

m. Administrative Memorandum of Agreement (between DEA and Mallinckrodt);[1]

n. Defendants' Transactional Data (KROGERMDL00000136, KrogerMDL00031102; PUBLIX-MDLT8-00058349);

o. Chain Pharmacy Defendants' Dispensing Data (hereafter, "Dispensing Data") (KrogerMDL00000121 - KrogerMDL00000123; PUBLIX-MDLT8-00000003 - PUBLIX-MDLT8-00000004; PDX_OPMDL_ORIG_LEGACY_DATA; PDX_OPMDL_NEW_LEGACY_DATA; ERX_OPMDL_PDXCONV_DATA);

p. Chain Pharmacy Defendants' Electronic Notes Data (hereafter, "Electronic Notes") more specifically described below (Kroger-MDL00051199; PUBLIX-MDLT8-00145543);

[1] www.justice.gov/usao-edmi/press-release/file/986026/download

q. Chain Pharmacy Defendants' Scanned Prescriptions and Related Documents (hereafter, "Scanned Prescriptions and Related Documents") more specifically described below (Kroger-MDL00050503 to Kroger-MDL00051198; PUBLIX-MDLT8-00135562 to PUBLIX-MDLT8-00137284 , PUBLIX-MDLT8-00137285 to PUBLIX-MDLT8-00139116);

r. Other documents cited in the text and footnotes below.

III. Assignment

11. I have been asked by Plaintiffs' Counsel to document how I processed, validated and augmented opioid transaction data produced by the Drug Enforcement Administration ("DEA") and internal transaction data from the Distributor Defendants if provided, to attribute transactions with Dispensers to Distributor Defendants and Chain Pharmacy Defendants in this report.

12. I have been asked to summarize shipments in the ARCOS Data, especially those shipments into Cobb County, GA attributable to Defendants.

13. I have been asked to report the results of applying certain algorithms to the ARCOS Data and Defendants' Transactional Data.

14. I have been asked to report the results of applying certain red flag algorithms to the Defendant Dispensing Data.

15. I have been asked to document how I appended the Electronic Notes, Scanned Prescriptions and Related Documents provided by Chain Pharmacy Defendants to the Dispensing Data for the 400 sample prescriptions selected ("Selected Sample Prescriptions") for each Defendant, and how I

appended the Electronic Notes to the patient history of prescriptions filled in Cobb County.

16. Further, I have also been asked to address the statistical significance and confidence intervals of random sampling.

IV. Summary of Opinions

17. Based upon my comparison of the ARCOS Data produced by the DEA and the public ARCOS Retail Drug Summary Reports, I conclude that, after correcting a relatively small number of records as explained in more detail below, the ARCOS Data produced by the DEA is reliable.

18. I conclude that the ARCOS Data is reliable in part because it closely matches the DEA's Retail Drug Summary Reports for January 2006 through December 2014. Retail Drug Summary Reports summarize the weight of drugs in reported transactions with consumers in each of the 50 states and the District of Columbia. Where there were discrepancies between the ARCOS Data produced by the DEA and the Retail Drug Summary Reports, I was able to identify and correct the error in either the ARCOS Data or the Retail Drug Summary Reports.

19. In Section V, I describe the ARCOS Data produced by the DEA and report national summary statistics for the ARCOS Data, after correcting minimal errors explained fully in Appendix 2. In addition, I compare the processed ARCOS Data to Retail Drug Summary Reports published by the DEA to verify that the shipments of opioids to dispensing outlets in the ARCOS Data are consistent with the amount of each opioid the DEA calculates was shipped into each 3-digit zip code each quarter.

20. In Section VI, I report summary statistics for subsets of the processed ARCOS Data covering Cobb County. These summary statistics show that between 2006 and 2019, Dispensers in Cobb County received 329.8 million Dosage Units or 7.5 billion MME of opioids. Given the county's 714,564 average population during this same time period,[2] Dispensers received enough opioids for every resident in Cobb County to consume 33 Dosage Units or 754 MME every year from 2006 to 2019.

21. In Sections VII and VIII, I describe a non-exhaustive set of algorithms that can be systematically applied to the ARCOS Data, supplemented with Defendants' Transactional Data.

22. In Section IX, I compare the ARCOS Data to the Dispensing Data produced in discovery and conclude that the Dispensing Data is reliable because it closely matches the ARCOS data in the relevant time period.

23. In Section X, I describe a non-exclusive set of certain "flagging" algorithms that can be systematically applied to the Dispensing Data and the results of such application.

24. In Section XI, I report how I appended the Electronic Notes, Scanned Prescriptions and Related Documents provided by Chain Pharmacy Defendants to the Dispensing Data for the Selected Sample Prescriptions for each Defendant, and how I appended the Electronic Notes to the patient history of prescriptions filled in Cobb County.

25. In Section XII, I discuss the statistical significance and confidence intervals of random sampling.

[2] United States Census Bureau, https://www.census.gov/

26. In Section XIII, I summarize my conclusions.

27. I continue to review documents and gather information and reserve the right to update my analysis and opinions based upon that further review of documents and based on any new information including, possibly, reports of other experts I may receive.

V. National ARCOS Data

28. ARCOS is the system through which manufacturers and distributors report transactions of controlled substances to the DEA.[3] ARCOS Data covers all fifty states, the District of Columbia, Puerto Rico, Guam, U.S. Virgin Islands, American Samoa, and the Northern Mariana Islands, Armed Forces-Americas, Armed Forces-EMEA, Armed Forces-Pacific, and Palau.

A. Receipt of ARCOS Data from the DEA

29. In the multi-district litigation, the DEA produced a set of ARCOS Data reflecting transactions in drug products containing one or more of fourteen drugs: buprenorphine, codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, levorphanol, meperidine, methadone, morphine, powdered opium, oxycodone, oxymorphone, and tapentadol from January 1, 2006 through December 31, 2019.

30. On or about April 20, 2018, the DEA produced ARCOS Data reflecting transactions in oxycodone, hydrocodone, hydromorphone, and fentanyl for six states: Alabama, Florida, Illinois, Michigan, Ohio, and West Virginia. On or about May 20, 2018, the DEA produced transaction data for

[3] www.deadiversion.usdoj.gov/arcos/arcos.html, accessed on 29 November 2018.

these four drugs for the remaining states. The May 20, 2018 production was missing pharmacy names and had some duplicate transactions and obvious errors. At my request, the DEA reproduced the May 20, 2018 data with pharmacy names and errors in the May 20, 2018 production largely corrected on or about June 5, 2018.

31. Additionally, the DEA produced ARCOS Data for all states for oxymorphone, tapentadol, buprenorphine, and morphine on or about July 6, 2018; for codeine, dihydrocodeine, meperidine, and powdered opium on or about July 24, 2018; and for methadone and levorphanol on or about August 28, 2018.

32. On August 14, 2023, the DEA produced ARCOS Data from January 1, 2015 to December 31, 2019 for all states on the fourteen drugs ("2015-2019 ARCOS Data").

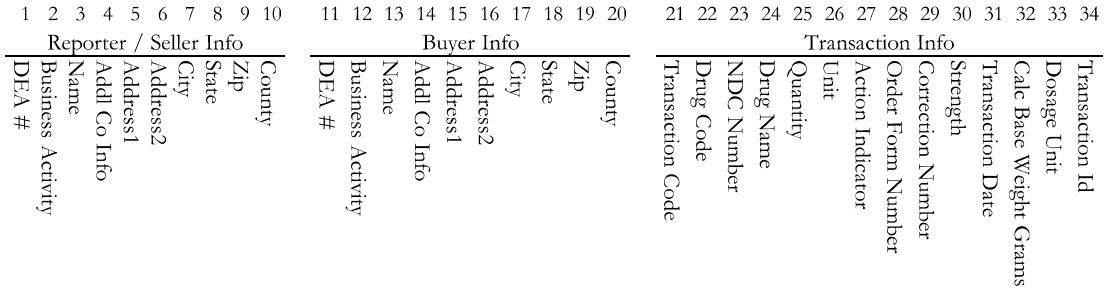
B. ARCOS Data Fields Produced by DEA

33. The ARCOS Data produced by the DEA has the 34 fields illustrated in Figure 1 for each transaction record. Twelve of the 34 fields are submitted with each transaction record by the Reporting Registrant, the DEA registered entity reporting the opioid shipment through ARCOS. These twelve fields are defined in the ARCOS Handbook.[4] The remaining 22 fields were appended by the DEA to the transaction records submitted by the Reporting

[4] "ARCOS Registrant Handbook," Drug Enforcement Administration, August 1997 ("ARCOS Handbook"). Current version available at https://web.archive.org/web/20161224182937/https://www.deadiversion.usdoj.gov/arcos/handbook/full.pdf.

Registrant.[5] Eighteen of the 22 fields are information about the Reporting Registrant and the Associate Registrant, keyed off their DEA numbers.[6] Three of the remaining four fields are either taken from the NDC (for National Drug Code) Dictionary or are calculated using variables therein and appear to have been imported by the DEA into the data it produced by matching each transaction's NDC number with the NDC number in the NDC Dictionary.[7]

Figure 1 ARCOS Data Fields Produced by DEA



34. The first 10 fields provide information on the Reporting Registrant. The DEA identified these Reporter DEA numbers and associated fields as "Seller" fields and so, unless the context requires otherwise, I refer to the Reporting Registrant as the "Seller" and the associated fields as "Seller" fields. This information includes a Seller's DEA Number, a description of the Seller's Business Activity (primarily Manufacturer, Distributor or Reverse Distributor), Name and Address (6 fields).

[5] The 22 fields are Reporter Business Activity, Reporter Name (2 fields), Reporter Address (6 fields), Buyer Business Activity, Buyer Name (2 fields), and Buyer Address (6 fields), Drug Code, Drug Name, Calculated Base Weight in Grams, and Dosage Unit.

[6] The 18 fields are Reporter Business Activity, Reporter Name (2 fields), Reporter Address (6 fields), Buyer Business Activity, Buyer Name (2 fields), and Buyer Address (6 fields).

[7] Drug Code and Drug Name are both in the NDC Dictionary. Calculated Base Weight in Grams is calculated using Ingredient Base Weight in the NDC Dictionary and Quantity, Unit, and Strength in the ARCOS Data.

35. The next 10 fields provide information on the Associate Registrant, typically a receiver of the opioid shipment.[8] The DEA identified the Associate Registrant DEA numbers and associated fields as "Buyer" fields and so, unless the context requires otherwise, I refer to the Associate Registrant as the "Buyer" and the associated fields as "Buyer" fields. This information includes the Buyer's DEA Number, a description of the Buyer's Business Activity (primarily Distributor or Retail or Chain Pharmacy), Name and Address (6 fields).

36. The final 14 fields provide information about the transaction. This information includes Drug Name and Drug Code (e.g. 9143 for oxycodone products), NDC Number, Quantity, Unit, Strength, Dosage Unit, Calculated Base Weight in Grams, Transaction Code (e.g., whether the transaction was a Purchase or a Sale), Transaction Date, Transaction Identifier, Correction Number, Action Indicator, and Order Form Number.

1. Seller DEA Number

37. The ARCOS Data produced by the DEA includes 1,870 distinct Seller DEA Numbers. Manufacturers and distributors typically have more than one DEA number as each facility manufacturing or distributing controlled substances must have its own DEA number.[9]

2. Seller Business Activity

38. The ARCOS Data lists one "Business Activity" for each Seller DEA Number. There are six distinct Seller Business Activities in the ARCOS

[8] *See*, ARCOS Handbook at pp. 5-36 – 5-37.

[9] *See*, ARCOS Handbook at 1-5.

Data: Manufacturer, Manufacturer (Bulk), Chemical Manufacturer, Distributor, Chempack/SNS Distributor, and Reverse Distributor.

3. Seller Name and Address

39. The ARCOS Data provides a business address for each Seller DEA Number, but there is not a one-to-one mapping between the addresses and the Seller DEA Numbers. Some Seller DEA Numbers are associated with multiple addresses, and some addresses are associated with more than one contemporaneous Seller DEA Number. Multiple Seller DEA Numbers can also be associated with the same address over time as locations are occupied by businesses newly registered with the DEA.

4. Buyer DEA Number

40. The ARCOS Data includes 365,736 distinct Buyer DEA Numbers. 1,828 DEA numbers are listed as both Sellers and Buyers, although not in the same transaction.

5. Buyer Business Activity

41. The ARCOS Data includes 59 distinct Buyer Business Activities including Manufacturer, Distributor, Reverse Distributor, Analytical Lab, Retail Pharmacy, Chain Pharmacy, Mail Order Pharmacy and Hospital/Clinic. Some Buyer DEA Numbers have more than one Buyer Business Activity.

6. Buyer Name and Address

42. The ARCOS Data provides a business address for each Buyer DEA Number, but there is not a one-to-one mapping between the addresses and the Buyer DEA Numbers. Some Buyer DEA Numbers are associated with multiple addresses, and some addresses are associated with more than one contemporaneous Buyer DEA Number. Multiple Buyer DEA Numbers can

also be associated with the same address over time as locations are occupied by businesses newly registered with the DEA.

7. Transaction Codes

43. Each transaction record includes a code that identifies whether the transaction being reported increases or decreases the Reporter's inventory of the drug. In my later analysis, I focus on transaction code "S" which denotes a transaction in which a drug is shipped from the Seller, typically a distributor, to a Buyer, typically a pharmacy.

8. Drug Code and Drug Name

44. The Drug Code is a four-digit Administration Controlled Substance Code Number common to each controlled substance or basic class thereof.[10] For instance, whether delivered through skin patches or nasal sprays, fentanyl transactions are identified by the Drug Code 9801 and whether formed in 5 mg or 20 mg tablets, oxycodone transactions are identified with the Drug Code 9143. See Table 1.

Table 1 Drug Codes and Drug Names in the ARCOS Data

Sorted by Drug Name		Sorted by Drug Code	
Drug Code	Drug Name	Drug Code	Drug Name
9064	Buprenorphine	9050	Codeine
9050	Codeine	9064	Buprenorphine
9120	Dihydrocodeine	9120	Dihydrocodeine
9801	Fentanyl	9143	Oxycodone
9193	Hydrocodone	9150	Hydromorphone
9150	Hydromorphone	9193	Hydrocodone
9220	Levorphanol	9220	Levorphanol
9230	Meperidine	9230	Meperidine
9250	Methadone	9250	Methadone
9300	Morphine	9300	Morphine
9639	Opium	9639	Opium
9143	Oxycodone	9652	Oxymorphone
9652	Oxymorphone	9780	Tapentadol
9780	Tapentadol	9801	Fentanyl

9. National Drug Code

45. Drug packages are uniquely identified in the ARCOS Data by a National Drug Code, or NDC. The NDC has three segments, which identify the drug product's manufacturer or distributor, active ingredient, strength and formulation of the product, and the package size.[11] For example, 00603-3882-

[10] See, Controlled Substances by DEA Drug Code Number, Current version available at https://www.deadiversion.usdoj.gov/schedules/orangebook/d_cs_drugcode.pdf; *see also*, 21 CFR 1308.03.

[11] "NDC Dictionary Instructions," Drug Enforcement Administration, October 2010. Current version available at https://www.deadiversion.usdoj.gov/arcos/ndc/readme.txt.

28 identifies Par Pharmaceutical manufactured 7.5 mg hydrocodone / 500 mg acetaminophen tablets in packages of 30. NDCs ending in "**" identify bulk packages of the drug identified by the first 9 digits of the NDC.

46. There are 29,635 unique NDCs in the ARCOS Data. The controlled substances in each drug product are identified by a separate Drug Code.

10. Quantity

47. Quantity is the number of packages, weight or volume reported in the transaction.[12] A package can take many different forms, including a bottle of pills, a bottle of liquid, a box containing multiple bottles of drug product, a container of bulk drug powder, a box of skin patches, or a larger box containing smaller boxes of skin patches.[13]

11. Unit

48. The Unit code identifies the unit of measurement for the Quantity field. It is used with the Quantity and Strength fields to determine the amount

[12] ARCOS Handbook § 5.11.1 p., 5-30.

[13] ARCOS Handbook § 5.11.

of drug in a transaction.[14] The Unit codes 1, 2, 3 and 4 specify weight units from micrograms to kilograms.[15] See Table 2.

Table 2 Unit of Measurement Codes

Unit	Measurement
1	Micrograms
2	Milligrams
3	Grams
4	Kilograms
5	Milliliters
6	Liters
D	Dozens
K	Thousands

12. Action Indicator

49. The Action Indicator field is either blank or coded D (for delete), A (for adjust) or I (for insert). The Reporter uses transactions coded D to report to the DEA that a previously reported incorrect transaction should be deleted. The Reporter uses transactions coded A to report that a previously reported incorrect transaction should be revised to reflect updated information in the current record. That is, that the previously reported transaction should be replaced with the current transaction record coded A. The Reporter uses transactions coded I to report transactions which should have been reported in a previous month but were not and so are being reported late.[16]

[14] ARCOS Handbook § 5.12.1, p. 5-33.

[15] Since there are 1 billion micrograms in a kilogram, a transaction coded with a 4 in the Unit field when the Quantity field assumes the Units are micrograms will have a Quantity that is 1 billion times too large. Some of the errors in the ARCOS Data appear to result from incorrect Unit codes being entered by the Reporting Registrant into ARCOS.

[16] ARCOS Handbook §5.9.2, p. 5-20 and §7.5, p. 7-12.

13. Order Form Number

50. The Order Form Number identifies a batch of one or more transactions submitted through ARCOS.[17]

14. Correction Number

51. The Correction Number identifies a correction transaction which replaces a previously submitted transaction that had been rejected by ARCOS.[18]

15. Strength

52. Strength reports the purity of bulk raw material in a transaction, relative to the purity of the NDC, in hundredths of a percentage point. Strength can also refer to the amount by which a quantity of one in the transaction falls short of or exceeds the standard size package of the NDC.[19]

16. Transaction Date

53. Transaction Date is the date a shipment occurred, not the date an order was placed by the Buyer or received by the Seller or the date of some other activity.[20]

17. Calculated Base Weight in Grams

54. The Calculated Base Weight in Grams is the total active ingredient weight, in grams, of a drug in the reported transaction. The Calculated Base Weight in Grams in the ARCOS Data produced by the DEA was not reported by the Sellers. Rather, it was calculated by the DEA and appended (along with information about the Buyer and the Seller, the Drug

[17] ARCOS Handbook §5.14.1, p. 5-38 and §5.14.3, p. 5-40.

[18] ARCOS Handbook, §5.16, p. 5-42.

[19] ARCOS Handbook, §5.17, p. 5-43.

[20] ARCOS Handbook, §5.15.1, p. 5-40.

Code, the Drug Name, and the Dosage Units) by the DEA before the data was produced. As explained in Appendix 2, I verify the Calculated Base Weight in Grams for each transaction using the NDC Dictionary.

18. Dosage Units

55. Dosage Units is the number of packages in the transaction, multiplied by the number of discrete individual drug products (e.g., pills, patches, lozenges) in each package. Dosage Unit is only populated if the drug product is delivered as a capsule, tablet, film, suppository, patch, lollipop, or lozenge. The Dosage Unit in the ARCOS Data was not reported by the Sellers. Rather, it was calculated by the DEA and appended by the DEA before the data was produced to us. As explained later in this report, I verify Dosage Units for each transaction using the NDC Dictionary.

19. Transaction ID

56. The Transaction ID uniquely identifies the transactions submitted by each Seller each month.[21] Each Seller restarts the Transaction ID each month at 1. For example, a Seller submitting 33, 41 and 17 transactions over a three-month period would submit transactions numbered 1 to 33 the first month, 1 to 41 the second month and 1 to 17 the third month. A later correction, adjustment or deletion should have the same Transaction ID as the record being corrected, adjusted or deleted. A late transaction uses the next available Transaction ID for the month in which the transaction should have been reported, not a Transaction ID for the month in which the late transaction is being reported.

[21] ARCOS Handbook, §5.18, pp. 5-46 through 5-47.

C. Supplementing the ARCOS Data

57. I added several fields to the ARCOS Data to assist in my analysis. The fields are drug Labeler names from the FDA, drug Labeler company families, Seller company families, drug product potency information from the CDC's Morphine Milligram Equivalents (MME) conversion table, and Buyer business activities from the Centers for Medicare and Medicaid Services.

1. Drug Labeler

58. The ARCOS Data includes the Seller name but not the Labeler name. As explained by the DEA, "A Labeler is any firm that manufacturers, distributes or repacks/relabels a drug product."[22] The Labeler is identified in the first segment of the NDC. The FDA, which assigns the Labeler identifier used in the NDC, maintains a public list of Labeler identifiers and their associated companies. I used the FDA's list of drug Labelers to add the names of the drug Labelers to the ARCOS Data.[23]

59. After adding Labeler names, I manually reviewed the names and grouped them into company families. For example, I assigned "Teva Pharmaceuticals USA, Inc." and "Teva Parenteral Medicines, Inc." to the same "Teva" company family.

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[22] NDC Dictionary Instructions. *See also*, ARCOS Handbook, §6.1.2.1, p. 6-2.

[23] NDC/NHRIC Labeler Codes," U.S. Food & Drug Administration. Available at www.fda.gov/ForIndustry/DataStandards/StructuredProductLabeling/ucm191017.htm. I updated Labeler names to the entire 2006-2019 ARCOS dataset after receiving the 2015-2019 ARCOS Data.

2. MME Conversion Factor

60. Because each drug can be prescribed in more than one dosage strength (e.g., 5 mg or 10 mg), compiling only the number of pills shipped provides a partial picture of the number of drugs shipped. Also, since different drugs can have different potencies, compiling only the total weight of active ingredient shipped also provides a partial picture of the number of drugs shipped.

61. The CDC has published "MME conversion factors" that allow opioids to be directly comparable to one another by converting different drugs and dosage strengths into morphine milligram equivalents.[24] I added the MME conversion factor to the ARCOS Data, matching the NDC in the CDC table to the NDC in the ARCOS Data.

3. Additional Pharmacy Information

62. I supplemented the Buyer Business Activity field with data from the Centers for Medicare and Medicaid Services, which assigns National Provider Identifiers ("NPIs") to most covered health care providers in the United States. In addition to assigning and tracking NPIs, the Centers for Medicare and Medicaid Services provides a classification of Buyers' Business Activities that is more detailed than the classification in the ARCOS Data, allowing me to better identify mail-order pharmacies, long-term care pharmacies, and managed care pharmacies. I used the Buyer Name and

[24] National Center for Injury Prevention and Control. CDC compilation of benzodiazepines, muscle relaxants, stimulants, zolpidem, and opioid analgesics with oral morphine milligram equivalent conversion factors, 2018 version. Atlanta, GA: Centers for Disease Control and Prevention; 2018. Available at www.hhs.gov/guidance/sites/default/files/hhs-guidance-documents/Opioid%20Morphine%20EQ%20Conversion%20Factors%20%28vFeb%202018%29.pdf.

Address in the ARCOS Data to look up each Buyer in the NPI database.[25] I used the NPI database to identify mail-order, long-term care and managed care pharmacies, but I otherwise relied on the Buyer Business Activity in the ARCOS Data.

D. Exclusions and Corrections to ARCOS Data

63. The ARCOS Data is composed of transactions, or shipments, of opioids between various entities. 96.1% of transactions with transaction code "S" reported in the ARCOS Data involve shipments to Buyers whose Business Activity suggests they dispense drugs to patients. I call these Buyers "Dispensers." [26]

64. I removed the following types of transactions from the ARCOS Data before conducting further analysis:

- Shipments of controlled drugs other than the 14 opioids were deleted.
- Duplicate transactions were identified and removed if 90% or more of a Reporter's transactions in a calendar month appeared more than once.
- Transactions containing values for both the Action Indicator and Correction Number fields were excluded as clear error.

[25] NPI database.

[26] I include the following Buyer Business Activities as Dispensers: any Buyer Business Activity beginning with "MLP"; any Buyer Business Activity containing "PHARMACY", "PRACTITIONER", "CLINIC", "MAINT" or "DETOX"; and "AUTOMATED DISPENSING SYSTEM", "CANINE HANDLER", and "TEACHING INSTITUTION."

- Transactions involving reverse distributors, analytical labs, importers, exporters, or researchers.
- Transactions with obvious errors in the reported Quantity.
- Transactions where the Transaction Code is "X" (Lost-in-Transit.)

65. I also corrected the Calculated Base Weight in Grams when it was calculated using an incorrect Ingredient Base Weight from the NDC Dictionary. Appendix 2 provides a detailed explanation of these exclusions and corrections.

E. Comparing ARCOS Data to Retail Drug Summary Reports

66. The DEA publishes six ARCOS Retail Drug Summary Reports ("RDSR") each year, which summarize the weight of opioids reported in ARCOS transactions by various combinations of Drug Code, Calendar Quarter, Buyer State, Buyer Zip Code, or Buyer's business activity.[27] The least aggregated Retail Drug Summary Report, Report 1, aggregates opioid weight by quadruples of Drug Code, Calendar Quarter, Buyer's State, and the first three digits of the Buyer's Zip Code. As a check on my procedures for correcting the ARCOS Data, I compared the ARCOS Data I received to ARCOS Retail Drug Summary Report 1 for 2006 to 2014 and 2015 to 2019 separately.

[27] The six summary reports are updated on an ad hoc basis. The DEA website states that the summary reports are "susceptible to future updates and corrections, without notice, as new information is obtained" (www.deadiversion.usdoj.gov/arcos/retail_drug_summary/arcos-drug-summary-reports.html).

1. 2006 to 2014 Comparison

67. I calculated the total Calculated Base Weight in Grams in the corrected 2006-2014 ARCOS Data for each Drug Code, Calendar Quarter, Buyer's State, and three-digit Buyer's Zip Code. I then compared the weights I calculated to the weights reported in ARCOS Retail Drug Summary Report 1 between 2006 and 2014.[28]

68. There are 409,061 Drug Code/Calendar Quarter/Buyer's State /three-digit Buyer's Zip Code quadruples in either the ARCOS Data or the RDSR dataset between 2006 and 2014. 408,389 of these observations are in both datasets, 457 are only in the ARCOS Data and 215 are only in the RDSR data. See Table 3.

69. The 457 observations that are in the ARCOS Data but not in the RDSRs have a total Calculated Base Weight in Grams of 217,068 grams. 216,544 grams (99.8%) of the 217,068 grams are from zip code 851** in Arizona.[29] The RDSRs do not report any weights for zip code 851** in 2006 and 2007, even though there are shipments to Buyers in this zip code in 2006 and 2007 in the ARCOS Data and the RDSRs closely match the ARCOS data for 851** after 2007. Other than the observations Retail Drug Summary Report 1 is missing for zip code 851** in 2006 and 2007, only 3,231 grams are in observations where there is not some data in both the ARCOS Data and RDSRs out of 1.4 billion grams.

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[28] I compared the weights for all quadruples created using all 14 Drug Codes in the ARCOS Data, every calendar quarter from 2006 through 2014, and all 50 states, the District of Columbia, Puerto Rico, American Samoa, and the Virgin Islands.

[29] 109 of the 457 transactions are from zip code 851** in Arizona.

Table 3 Comparison Corrected ARCOS Data and RDSR, 2006 to 2014

	Drug Code/Quarter/State/ 3-digit Zip Codes in Both Datasets			Drug Code/Quarter/State/ Zip Codes in ARCOS Only		Drug Code/Quarter/State/ Zip Codes in RDSR Only	
Drug Code	**N**	**Weight of Base Drug (ARCOS)**	**Weight of Base Drug (RDSR)**	**N**	**Weight of Base Drug**	**N**	**Weight of Base Drug**
9780	21,175	27,832,183	27,836,251	0	0	1	8
9220L	13,821	17,098	16,555	26	64	27	20
9639	30,138	312,322	5,549,118	11	21	34	81
9064	31,923	13,056,340	12,949,923	34	403	5	6
9801	32,116	4,383,862	4,266,080	12	501	12	7
9652	31,287	11,059,802	10,638,657	12	583	13	46
9120	23,214	755,277	746,160	299	590	42	69
9150	32,042	12,838,084	12,899,632	8	930	6	8
9230	32,049	22,785,269	23,105,649	11	4,407	11	147
9050	32,155	140,440,556	149,474,318	8	24,695	13	138
9250B	32,075	133,963,921	134,698,794	8	11,505	9	78
9193	32,164	337,565,862	340,741,300	10	41,620	16	1,342
9300	32,111	195,236,784	195,377,422	10	54,031	13	456
9143	32,119	489,503,746	490,414,951	8	77,718	13	302
Total	**408,389**	**1,389,751,107**	**1,408,714,811**	**457**	**217,068**	**215**	**2,707**

70. It is possible that both the ARCOS Data and the RDSRs have drug weights, but the weights differ between the ARCOS Data and the RDSRs data. To test this possibility, I calculate the ratio of the weight of each drug, each quarter, each state and 3-digit zip code reported in the RDSRs to the weights I calculated from the ARCOS transactions for the observations in both the RDSRs and the ARCOS transactions. A ratio of 1 (less than 1, more than 1) means the RDSRs summary weights equal (are less than, are more than) the weights I aggregate up to using the ARCOS transaction data.

71. Table 4 reports the results of this test of the ARCOS Data. 270,300 or 66.2% of the 408,389 Drug Code/Quarter/State/3-digit zip code quadruple observations in both ARCOS and the RDSRs have ratios between 0.995 and 1.005. That is, 2/3^{rds} of the observations have RDSRs reported summary weights within 0.5% of the weights I aggregate up from the ARCOS transaction data. 72.4% of the observations have RDSRs reported summary

weights within 1.0% of the weights I aggregate up from the processed ARCOS transaction data.

72. The RDSRs confirm the accuracy of the ARCOS Data I received. The correlation between the RDSRs' reported drug weight and the weights I calculate from the ARCOS Data is **0.999** on a scale from -1.00 to +1.00.

Table 4 Ratios of Retail Drug Summary Report and ARCOS Drug Weights, 2006 to 2014

Drug Code	N	N(%)	1st Percentile	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	99th Percentile
9050	32,155	7.9%	0.97	1.01	1.04	1.07	1.11	1.20	1.32
9064	31,923	7.8%	0.76	0.92	1.00	1.00	1.00	1.02	1.09
9120	23,214	5.7%	0.00	0.71	1.00	1.00	1.00	1.01	1.19
9143	32,119	7.9%	0.90	0.97	1.00	1.00	1.00	1.02	1.11
9150	32,042	7.8%	0.82	0.97	1.00	1.00	1.00	1.03	1.28
9193	32,164	7.9%	0.89	0.98	1.00	1.00	1.00	1.04	1.35
9220L	13,821	3.4%	0.93	0.93	0.99	1.00	1.00	1.03	1.03
9230	32,049	7.8%	0.89	0.98	1.00	1.00	1.01	1.12	1.37
9250B	32,075	7.9%	0.86	0.99	1.00	1.00	1.00	1.02	1.30
9300	32,111	7.9%	0.88	0.98	1.00	1.00	1.00	1.03	1.17
9639	30,138	7.4%	0.91	1.00	1.00	1.00	1.00	1.00	1.06
9652	31,287	7.7%	0.75	0.94	1.00	1.00	1.00	1.00	1.10
9780	21,175	5.2%	0.93	1.00	1.00	1.00	1.00	1.00	1.07
9801	32,116	7.9%	0.84	0.95	0.98	1.00	1.00	1.06	1.31
Total	**408,389**	**100.0%**	**0.81**	**0.96**	**1.00**	**1.00**	**1.00**	**1.09**	**1.24**

2. 2015 to 2019 Comparison

73. I calculated the total Calculated Base Weight in Grams in the 2015-2019 ARCOS Data for each Drug Code, Calendar Quarter, Buyer's State, and three-digit Buyer's Zip Code. I then compared the base weights I

calculated to the base weights reported in ARCOS Retail Drug Summary Report 1 (RDSR) between 2015 and 2019. [30]

74. There are 209,761 Drug Code/Calendar Quarter/Buyer's State /three-digit Buyer's Zip Code quadruples in either the ARCOS Data or the RDSR dataset between 2015 and 2019. 209,498 of these observations are in both datasets, 195 are only in the ARCOS Data and 68 are only in the RDSR data.

75. The 195 observations that are in the ARCOS Data but not in the RDSR data have a total Calculated Base Weight in Grams of 3,995 grams. The 68 observations that are in the RDSR Data but not in the ARCOS data have a total Calculated Base Weight in Grams of 391 grams. To put these numbers into context, both ARCOS and RDSR report an aggregate base weight exceeding 660 million grams.

76. Table 5 reports the ratio of RDSR-reported base weight over ARCOS-reported base weights for each quadruple of Drug Code, Calendar Quarter, Buyer's State, and three-digit Buyer's Zip Code where both ARCOS and RDSR report a positive base weight. [31] Only 5% of the Drug Code/Calendar Quarter/Buyer's State /three-digit Buyer's Zip Code quadruple observations have ratios less than 0.99 and more than 95% of the

[30] The ARCOS data used in the comparison includes shipments to buyers located in 50 U.S. states, District of Columbia, Puerto Rico, Guam, Virgin Islands and America Samoa, excluding (i) shipments to buyers with a buyer business activity of distributor, manufacturer, analytical lab, importer, exporter, researcher or canine handler and (ii) shipments of dihydrocodeine, levorphanol and opium (powdered) in 2018 and 2019 due to missing data for these three drugs in these two years in RDSR.

[31] A ratio of 1 (less than 1, more than 1) means the RDSR-reported base weight is equal to (less than, more than) the ARCOS-reported base weights.

quadruple observations have ratios no more than 1.06. Furthermore, 78%, 83% and 93% of the quadruple observations have RDSR-reported weights within 0.5%, 1% and 5% of ARCOS-reported weights, respectively.

Table 5 Ratios of RDSR over ARCOS Base Weights, 2015 to 2019

Drug Code	N	N(%)	1st Percentile	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	99th Percentile
9050	17,854	8.5%	0.97	1.01	1.03	1.05	1.08	1.15	1.25
9064	17,803	8.5%	0.88	0.99	1.00	1.00	1.00	1.00	1.05
9120	2,968	1.4%	0.55	0.94	1.00	1.00	1.00	1.05	1.77
9143	17,854	8.5%	0.96	0.99	1.00	1.00	1.00	1.01	1.04
9150	17,822	8.5%	0.89	0.98	1.00	1.00	1.00	1.01	1.11
9193	17,865	8.5%	0.96	0.99	1.00	1.00	1.00	1.01	1.05
9220	2,903	1.4%	0.99	0.99	1.00	1.00	1.01	1.03	1.03
9230	17,376	8.3%	0.88	0.98	1.00	1.00	1.00	1.02	1.12
9250	17,818	8.5%	0.70	0.97	1.00	1.00	1.00	1.00	1.05
9300	17,855	8.5%	0.93	0.99	1.00	1.00	1.00	1.02	1.11
9639	9,007	4.3%	0.95	1.00	1.00	1.00	1.00	1.00	1.07
9652	17,066	8.1%	0.95	1.00	1.00	1.00	1.00	1.00	1.05
9780	17,468	8.3%	0.96	1.00	1.00	1.00	1.00	1.00	1.05
9801	17,839	8.5%	0.92	0.98	1.00	1.00	1.00	1.01	1.08
Total	**209,498**	**100.0%**	**0.90**	**0.99**	**1.00**	**1.00**	**1.00**	**1.06**	**1.14**

77. I conclude that aggregating the 2015-2019 transaction-level ARCOS data I received to the level of Drug Code/Calendar Quarter/Buyer's State /three-digit Buyer's Zip Code produces very similar results to those reported in RDSRs. This confirms the accuracy of the newly produced ARCOS Data.

F. Shipments to Dispensers in ARCOS Data

78. Table 6 summarizes the shipments to Dispensers in the ARCOS Data, grouped by the Reporter's Business Activity. Distributors account for 99.0% of Dosage Units, 98.4% of Calculated Base Weight in Grams and 98.5% of MME shipped to Dispensers. Manufacturers account for the remaining 1.0% of Dosage Units, 1.6% of Calculated Base Weight in Grams and 1.6% of MME shipped to Dispensers.

Table 6 Transactions in the ARCOS Data by Reporter's Business Activity

Reporter Business Activity	Transactions	Dosage Units	Dosage Units %	Calculated Base Weight	Calculated Weight %	MME	MME %
Distributor	632,412,336	195,609,667,390	98.96%	2,016,491,099	98.43%	4,265,827,286,451	98.45%
Manufacturer	4,089,071	2,064,000,930	1.04%	32,155,261	1.57%	67,060,381,062	1.55%
Manufacturer (Bulk)	263	1,650	0.00%	25,577	0.00%	172,387,818	0.00%
Chempack/SNS Distributor	5	3,100	0.00%	12	0.00%	12,108	0.00%
Chemical Manufacturer	13	100	0.00%	1	0.00%	1,535	0.00%
Total	**636,501,688**	**197,673,673,170**	**100.00%**	**2,048,671,949**	**100.00%**	**4,333,060,068,974**	**100.00%**

79. Table 7 summarizes the same shipments to Dispensers, grouped by Buyer's Business Activity. Chain and retail pharmacies received 90.3% of Dosage Units and 80.9% of MME.

Table 7 Transactions in the ARCOS Data by Buyer's Business Activity

Buyer Business Activity	Transactions	Dosage Units	Dosage Units %	Calculated Base Weight	Calculated Weight %	MME	MME %
Chain Pharmacy	370,719,406	111,930,819,179	56.62%	1,019,929,320	49.78%	2,017,218,730,753	46.55%
Retail Pharmacy	210,893,340	66,551,177,787	33.67%	717,927,644	35.04%	1,489,043,698,273	34.36%
Maint & Detox	760,990	496,961,059	0.25%	98,926,334	4.83%	371,908,294,445	8.58%
Hospital/Clinic	41,202,167	6,293,841,018	3.18%	64,282,841	3.14%	136,352,435,507	3.15%
Hosp/Clinic-VA	3,164,853	4,946,912,570	2.50%	44,079,820	2.15%	83,768,675,131	1.93%
Comp/Maint/Detox	28,818	78,549,374	0.04%	19,197,622	0.94%	70,194,487,339	1.62%
Maintenance	72,115	93,065,131	0.05%	16,811,697	0.82%	65,643,940,880	1.51%
M/O Pharmacy	1,380,283	2,429,563,382	1.23%	27,621,695	1.35%	49,303,189,990	1.14%
Practitioner	6,256,740	797,304,879	0.40%	8,571,455	0.42%	13,702,063,648	0.32%
Pharmacy - Fed	64,503	2,602,767,705	1.32%	17,787,008	0.87%	11,175,175,657	0.26%
Hosp/Clinic- Mil	681,607	794,073,032	0.40%	6,158,405	0.30%	9,026,769,978	0.21%
Practitioner-DW/100	188,618	75,713,702	0.04%	913,517	0.04%	3,478,704,862	0.08%
Hosp/Clinic Fed	345,979	257,794,372	0.13%	2,462,188	0.12%	3,071,680,140	0.07%
Compound/Maint	1,483	2,274,610	0.00%	821,408	0.04%	2,785,159,612	0.06%
Practitioner-DW/30	164,705	87,563,708	0.04%	1,221,841	0.06%	2,205,091,480	0.05%
Central Fill Pharmacy	236,924	176,410,835	0.09%	1,284,622	0.06%	1,919,876,937	0.04%
Practitioner-DW/275	87,174	16,500,420	0.01%	184,490	0.01%	1,313,012,659	0.03%
Other*	251,983	42,380,407	0.02%	490,043	0.02%	949,081,682	0.02%
Total	**636,501,688**	**197,673,673,170**	**100.00%**	**2,048,671,949**	**100.00%**	**4,333,060,068,974**	**100.00%**

* Each of the following Buyer Business Activities account for 0.01% or less of Dosage Units, Calculated Base Weight, and MME: Detoxification, Pharmacy- Mil, Chain Hosp/Clinic, MLP-Physician Assistant, MLP-Nurse Practitioner, Compound/Detox, Teaching Institution, MLP-Ambulance Service, MLP-Nurse Practitioner-DW/30, MLP-Physician Assistant-DW/100, MLP-Naturopathic Physician, MLP-Animal Shelter, Canine Handler, MLP-Registered Pharmacist, Practitioner Fed, MLP-Optometrist, Practitioner-Military, MLP-Physician Assistant-DW/30, Automated Dispensing System, MLP-Nurse Practitioner-DW/100, Hosp/Clinic NG, MLP-Nurse Practitioner-DW/30Sw, MLP-Euthanasia Technician, Military-Practitioner, MLP-Dept Of State, MLP-Military, MLP-Physician Assistant Fed

80. Table 8 summarizes the shipments to Dispensers reported in the ARCOS Data, by Drug Name sorted by MME. I separate the two treatment drugs - methadone and buprenorphine – from the other twelve opioids. 81.1% of the Dosage Units, 58.4% of the drug weight and 36.0% of the MME are in hydrocodone and oxycodone transactions. Fentanyl's ranking by MME is much higher than its ranking by Dosage Units and Calculated Base Weight because of fentanyl's extraordinary potency.

Table 8 Dispenser Transactions in the ARCOS Data, by Drug Name

Drug Name	# of Transactions	Dosage Units	Dosage Units %	Calculated Base Weight	Calculated Weight %	MME	MME %
Oxycodone	167,769,150	61,647,168,092	31.19%	725,686,019	35.42%	1,088,529,028,210	25.12%
Fentanyl	60,140,979	1,109,283,801	0.56%	5,844,753	0.29%	590,145,001,965	13.62%
Hydrocodone	213,430,334	98,697,187,378	49.93%	471,235,495	23.00%	471,235,495,103	10.88%
Morphine	58,396,509	9,254,542,860	4.68%	277,403,141	13.54%	277,403,141,102	6.40%
Hydromorphone	22,303,428	3,858,673,445	1.95%	19,657,601	0.96%	78,630,404,962	1.81%
Oxymorphone	7,763,472	929,264,031	0.47%	16,026,137	0.78%	48,078,410,597	1.11%
Codeine	21,456,847	8,373,185,647	4.24%	214,562,700	10.47%	32,184,404,967	0.74%
Tapentadol	5,411,840	631,632,581	0.32%	53,501,503	2.61%	21,400,601,011	0.49%
Meperidine	4,459,257	317,163,390	0.16%	25,795,935	1.26%	2,579,593,500	0.06%
Opium	405,440	9,649,040	0.00%	459,838	0.02%	459,837,713	0.01%
Levorphanol	92,772	26,678,599	0.01%	32,681	0.00%	359,487,791	0.01%
Dihydrocodeine	675,162	48,741,005	0.02%	886,303	0.04%	221,575,683	0.01%
Buprenorphine	54,198,323	4,198,635,105	2.12%	30,284,837	1.48%	922,050,986,110	21.28%
Methadone	19,998,175	8,571,868,197	4.34%	207,295,008	10.12%	799,782,100,260	18.46%
Total	**636,501,688**	**197,673,673,170**	**100.00%**	**2,048,671,949**	**100.00%**	**4,333,060,068,974**	**100.00%**

81. The distribution of shipments to Dispensers reported in the ARCOS Data by the Buyer's State is presented in Table 9. Dispensers in California received the most Dosage Units, Calculated Base Weight in Grams and MME of any state, followed by Florida, New York, Pennsylvania, Texas and Ohio. These six states account for a little more than 36% of the opioid shipments by Dosage Units, by Calculated Base Weight in Grams and by MME.

82. States at the top of Table 9 are also the most populous states so the last two columns list the states' average annual MME per capita and ranking by average MME per capita over the 2006-2019 period. I have highlighted in bold the top 10 states by average annual MME per capita.

Table 9 Transactions by Buyer's State

Buyer State	Transactions	Dosage Units	%	Calculated Base Weight	%	MME	%	Annual MME Per Capita	MME Per Capita Rank
California	49,623,775	20,488,239,981	10.36%	208,108,784	10.16%	367,357,839,524	8.48%	689.4	44
Florida	41,774,277	12,986,249,236	6.57%	163,399,700	7.98%	330,496,943,708	7.63%	1,201.1	16
New York	31,835,770	8,616,011,666	4.36%	107,090,001	5.23%	273,399,032,051	6.31%	1,000.4	29
Pennsylvania	**30,068,630**	**8,345,260,235**	**4.22%**	**97,271,892**	**4.75%**	**243,945,143,445**	**5.63%**	**1,369.4**	**9**
Texas	39,894,211	12,742,125,627	6.45%	120,019,861	5.86%	202,427,046,335	4.67%	550.0	49
Ohio	25,660,505	8,237,903,229	4.17%	76,146,884	3.72%	175,145,332,566	4.04%	1,080.6	22
Tennessee	**20,377,742**	**8,136,339,535**	**4.12%**	**79,298,502**	**3.87%**	**158,576,803,268**	**3.66%**	**1,750.2**	**1**
North Carolina	24,326,111	6,793,405,883	3.44%	67,112,925	3.28%	151,917,402,544	3.51%	1,109.5	19
Michigan	23,150,048	7,595,415,845	3.84%	76,235,671	3.72%	145,114,802,760	3.35%	1,043.0	26
New Jersey	15,763,744	3,801,029,863	1.92%	54,845,716	2.68%	131,004,730,509	3.02%	1,057.1	24
Georgia	21,622,969	5,826,550,285	2.95%	59,166,018	2.89%	123,327,249,509	2.85%	885.9	35
Massachusetts	11,061,190	3,369,263,975	1.70%	38,602,591	1.88%	118,881,276,095	2.74%	1,272.7	13
Maryland	11,882,903	3,170,749,760	1.60%	43,232,388	2.11%	110,192,557,599	2.54%	1,339.1	12
Illinois	18,455,676	5,654,726,496	2.86%	52,733,111	2.57%	108,313,555,303	2.50%	604.6	45
Washington	15,415,028	5,113,891,325	2.59%	47,401,511	2.31%	102,647,515,728	2.37%	1,052.6	25
Indiana	15,528,041	5,143,225,996	2.60%	46,321,464	2.26%	100,512,623,218	2.32%	1,096.9	21
Arizona	13,875,319	4,802,474,209	2.43%	55,556,140	2.71%	98,976,225,391	2.28%	1,067.3	23
Alabama	**15,080,388**	**4,534,872,547**	**2.29%**	**44,540,396**	**2.17%**	**96,471,751,304**	**2.23%**	**1,435.1**	**8**
Virginia	15,441,490	4,204,876,884	2.13%	42,047,375	2.05%	92,753,742,623	2.14%	810.9	39
Kentucky	**12,801,009**	**4,382,102,445**	**2.22%**	**36,421,071**	**1.78%**	**92,376,269,557**	**2.13%**	**1,508.4**	**7**
Missouri	15,025,857	4,434,145,440	2.24%	42,658,661	2.08%	80,389,769,623	1.86%	953.8	32
Louisiana	11,252,713	3,324,572,425	1.68%	32,546,838	1.59%	74,365,585,326	1.72%	1,162.8	18
Wisconsin	12,603,194	3,292,263,154	1.67%	33,345,478	1.63%	69,885,541,427	1.61%	872.8	37
Oregon	9,561,240	3,522,069,803	1.78%	32,629,715	1.59%	67,687,231,168	1.56%	1,228.4	15
Connecticut	7,067,018	1,742,110,541	0.88%	24,863,888	1.21%	67,323,174,230	1.55%	1,345.6	11
Oklahoma	11,812,187	3,574,445,785	1.81%	36,676,786	1.79%	67,093,639,619	1.55%	1,257.5	14
South Carolina	11,179,439	4,114,120,049	2.08%	38,180,013	1.86%	66,666,622,676	1.54%	1,000.3	30
Colorado	10,797,154	3,018,306,905	1.53%	28,932,977	1.41%	57,366,051,892	1.32%	781.8	41
Nevada	5,915,670	2,910,926,371	1.47%	28,419,475	1.39%	47,038,879,667	1.09%	1,200.3	17
West Virginia	**5,813,165**	**1,893,396,471**	**0.96%**	**17,916,540**	**0.87%**	**44,903,588,021**	**1.04%**	**1,747.4**	**2**
Utah	7,289,964	1,828,397,373	0.92%	19,950,069	0.97%	44,655,077,990	1.03%	1,108.3	20
Minnesota	8,991,696	2,263,825,839	1.15%	20,741,052	1.01%	44,086,166,570	1.02%	582.9	47
Mississippi	7,765,885	2,084,476,901	1.05%	18,480,925	0.90%	39,591,823,853	0.91%	952.5	33
Arkansas	8,612,120	2,434,953,552	1.23%	23,558,362	1.15%	39,142,831,119	0.90%	950.7	34
Kansas	7,124,562	2,113,847,691	1.07%	18,983,311	0.93%	34,343,141,396	0.79%	855.5	38
Maine	**3,576,879**	**979,038,138**	**0.50%**	**10,829,511**	**0.53%**	**32,515,408,507**	**0.75%**	**1,745.5**	**3**
New Mexico	4,028,127	1,332,290,976	0.67%	14,006,953	0.68%	29,854,079,520	0.69%	1,035.1	27
New Hampshire	**3,162,527**	**737,307,893**	**0.37%**	**8,961,685**	**0.44%**	**25,153,818,107**	**0.58%**	**1,353.5**	**10**
Iowa	6,141,330	1,460,322,431	0.74%	12,141,835	0.59%	22,720,953,993	0.52%	526.9	50
Rhode Island	**1,998,392**	**594,550,398**	**0.30%**	**7,665,424**	**0.37%**	**22,682,401,974**	**0.52%**	**1,534.2**	**6**
Delaware	**2,314,215**	**664,610,774**	**0.34%**	**9,089,878**	**0.44%**	**20,077,167,948**	**0.46%**	**1,557.5**	**5**
Idaho	3,776,304	1,093,306,761	0.55%	9,779,395	0.48%	19,887,396,997	0.46%	878.4	36
Vermont	**1,666,689**	**373,435,821**	**0.19%**	**4,061,034**	**0.20%**	**14,785,858,668**	**0.34%**	**1,690.5**	**4**
Montana	2,918,537	720,003,502	0.36%	6,845,492	0.33%	13,840,939,466	0.32%	978.2	31
Hawaii	1,930,953	647,473,573	0.33%	7,288,833	0.36%	13,591,688,581	0.31%	701.2	43
Nebraska	3,860,828	830,240,765	0.42%	7,157,368	0.35%	13,392,196,977	0.31%	514.6	51
Alaska	1,476,281	444,648,869	0.22%	4,622,866	0.23%	10,270,884,162	0.24%	1,019.9	28
District of Columbia	603,458	213,146,806	0.11%	2,979,415	0.15%	6,864,871,359	0.16%	767.1	42
South Dakota	1,704,964	411,538,224	0.21%	3,751,383	0.18%	6,766,220,744	0.16%	578.5	48
Wyoming	1,445,016	359,943,156	0.18%	3,243,341	0.16%	6,383,574,405	0.15%	803.5	40
North Dakota	1,446,498	315,241,762	0.16%	2,811,449	0.14%	5,895,639,952	0.14%	593.4	46
Total	**636,501,688**	**197,673,673,170**	**100.00%**	**2,048,671,949**	**100.00%**	**4,333,060,068,974**	**100.00%**		

83. The distribution of shipments to Dispensers reported in the ARCOS Data by year is presented in Table 10. The number of transactions, Dosage Units, Calculated Base Weight in Grams and MME all increased between 40% and 50% from 2006 to 2011.

Table 10 Transactions by Year

Year	Transactions	Dosage Units	Dosage Units %	Calculated Base Weight	Calculated Weight %	MME	MME %
2006	39,553,440	11,767,279,603	5.95%	122,713,770	5.99%	228,045,284,318	5.26%
2007	43,185,574	13,059,507,447	6.61%	133,833,183	6.53%	256,172,820,578	5.91%
2008	44,274,815	14,183,911,305	7.18%	143,453,125	7.00%	272,561,209,071	6.29%
2009	45,508,944	15,188,696,863	7.68%	154,579,935	7.55%	298,179,308,802	6.88%
2010	47,822,982	15,931,571,842	8.06%	165,247,922	8.07%	323,773,069,633	7.47%
2011	51,015,515	16,983,377,491	8.59%	173,144,735	8.45%	337,733,229,661	7.79%
2012	51,880,360	16,858,641,619	8.53%	171,035,615	8.35%	342,302,301,144	7.90%
2013	52,085,299	16,085,089,757	8.14%	162,078,440	7.91%	337,449,409,292	7.79%
2014	48,682,590	15,672,353,345	7.93%	158,982,708	7.76%	340,815,678,028	7.87%
2015	45,811,768	14,842,470,036	7.51%	157,951,993	7.71%	341,741,254,748	7.89%
2016	45,785,593	13,964,310,364	7.06%	149,625,016	7.30%	333,705,194,407	7.70%
2017	43,232,679	12,596,367,979	6.37%	135,162,068	6.60%	318,895,295,744	7.36%
2018	39,659,703	10,839,153,642	5.48%	116,536,334	5.69%	301,232,076,650	6.95%
2019	38,002,426	9,700,941,876	4.91%	104,327,105	5.09%	300,453,936,898	6.93%
Total	**636,501,688**	**197,673,673,170**	**100.00%**	**2,048,671,949**	**100.00%**	**4,333,060,068,974**	**100.00%**

VI. Opioid Shipment Summary

A. ARCOS Summary of Shipments to Cobb County

84. In this section, I summarize opioid shipment transactions by drug, by reporter's business activity, by buyer's business activity, and by year for Cobb County.

85. Between 2006 and 2019, Dispensers in Cobb County received 7.5 billion MME of opioids. Given the county's 714,564 population,[32] Dispensers received enough opioids for every resident in the county to

[32] https://www.census.gov/

consume 754 MME every year from 2006 to 2019. Table 11 through Table 15 summarize those transactions reported in the ARCOS Data for Cobb County.

86. Between 2006 and 2019, Dispensers in Cobb County received 329.8 million Dosage Units of opioids. As shown in Table 11, oxycodone accounted for 38.9% of all Dosage Units and 30.8% of MME in the county. Hydrocodone accounted for 43.0% of all Dosage Units and 9.2% of MME. Buprenorphine and fentanyl have a large MME relative to their Dosage Units because both are often prescribed as skin patches, which deliver the drug for up to one week.

Table 11 Transactions in Cobb County by Drug

Drug Name	# of Transactions	Dosage Units	Dosage Units %	MME	MME %
Oxycodone	414,841	128,372,479	38.93%	2,324,799,132	30.80%
Fentanyl	124,282	2,693,185	0.82%	1,199,842,705	15.90%
Hydrocodone	496,250	141,835,418	43.01%	692,540,984	9.18%
Morphine	112,769	16,053,580	4.87%	467,595,365	6.20%
Hydromorphone	38,970	5,462,205	1.66%	126,392,300	1.67%
Oxymorphone	14,080	1,534,757	0.47%	74,572,706	0.99%
Tapentadol	17,108	1,812,968	0.55%	66,031,840	0.87%
Codeine	26,768	7,975,587	2.42%	28,405,639	0.38%
Meperidine	13,380	1,352,275	0.41%	7,445,523	0.10%
Opium, Powdered	638	14,836	0.00%	753,720	0.01%
Dihydrocodeine	1,778	195,006	0.06%	596,735	0.01%
Levorphanol	187	33,200	0.01%	445,401	0.01%
Buprenorphine	121,197	7,030,594	2.13%	1,451,089,617	19.23%
Methadone	42,216	15,401,565	4.67%	1,106,637,450	14.66%
Total	**1,424,464**	**329,767,655**	**100.00%**	**7,547,149,116**	**100.00%**

87. Table 12 shows that virtually all transactions involving Dispensers in Cobb County were reported by Distributors.

Table 12 Transactions in Cobb County by Reporter's Business Activity

Reporter Business Activity	# of Transactions	Dosage Units	Dosage Units %	MME	MME %
Distributor	1,415,234	327,862,477	99.42%	7,492,807,474	99.28%
Manufacturer	9,230	1,905,179	0.58%	54,341,642	0.72%
Total	**1,424,464**	**329,767,655**	**100.00%**	**7,547,149,116**	**100.00%**

88. In Cobb County, chain pharmacies accounted for 65.7% of opioid Dosage Units and 52.4% of opioid MME, and retail pharmacies for 30.6% of Dosage Unites and 36.2% of MME. See Table 13.

Table 13 Transactions in Cobb County by Buyer's Business Activity

Buyer Business Activity	# of Transactions	Dosage Units	Dosage Units %	MME	MME %
Chain Pharmacy	1,010,972	216,707,505	65.72%	3,955,038,797	52.40%
Retail Pharmacy	351,951	100,933,061	30.61%	2,731,849,769	36.20%
Maint & Detox	757	1,519,750	0.46%	604,899,594	8.01%
Hospital/Clinic	36,128	6,723,866	2.04%	172,407,912	2.28%
Practitioner	20,056	2,373,336	0.72%	42,465,778	0.56%
Practitioner-DW/100	1,385	538,467	0.16%	21,895,132	0.29%
Practitioner-DW/30	2,867	846,475	0.26%	13,036,539	0.17%
Practitioner-DW/275	294	117,390	0.04%	5,518,716	0.07%
MLP-Physician Assistant	35	7,655	0.00%	35,592	0.00%
MLP-Nurse Practitioner	19	151	0.00%	1,286	0.00%
Total	**1,424,464**	**329,767,655**	**100.00%**	**7,547,149,116**	**100.00%**

89. Table 14 lists all Dispenser transactions in Cobb County by transaction year.

Table 14 Transactions in Cobb County by Year

Transaction Year	# of Transactions	Dosage Units	Dosage Units %	MME	MME %
2006	94,345	19,768,210	5.99%	415,396,550	5.50%
2007	101,426	21,368,020	6.48%	450,086,249	5.96%
2008	106,855	22,829,296	6.92%	474,471,279	6.29%
2009	105,674	24,464,365	7.42%	508,822,020	6.74%
2010	106,205	25,232,310	7.65%	566,229,503	7.50%
2011	114,709	28,276,164	8.57%	630,656,606	8.36%
2012	118,250	27,530,387	8.35%	611,119,136	8.10%
2013	115,852	25,879,488	7.85%	573,158,308	7.59%
2014	104,276	25,010,171	7.58%	565,263,499	7.49%
2015	98,019	24,615,180	7.46%	597,452,410	7.92%
2016	98,079	24,069,922	7.30%	591,149,287	7.83%
2017	94,336	22,217,594	6.74%	552,921,898	7.33%
2018	84,370	19,086,592	5.79%	496,821,260	6.58%
2019	82,068	19,419,956	5.89%	513,601,113	6.81%
Total	**1,424,464**	**329,767,655**	**100.00%**	**7,547,149,116**	**100.00%**

90. Table 15 lists the top 20 Labelers of the 14 opioid drugs by MME - accounting for 91.86% of the total MME shipped to Dispensers - in Cobb County.

Table 15 Top 20 Labelers, Cobb County, ARCOS Data, 2006-2019

Rank	Labeler	MME	Percent	Cumulative
1	SpecGx LLC	1,422,922,332	18.85%	18.85%
2	Actavis	891,944,592	11.82%	30.67%
3	Indivior Inc.	889,328,566	11.78%	42.46%
4	Hikma Pharmaceuticals USA Inc.	825,980,507	10.94%	53.40%
5	Purdue	671,971,769	8.90%	62.30%
6	Par Pharmaceutical, Inc.	471,869,047	6.25%	68.56%
7	Mylan	401,302,234	5.32%	73.87%
8	Amneal	180,644,359	2.39%	76.27%
9	Johnson & Johnson	167,009,520	2.21%	78.48%
10	Sandoz Inc	155,475,558	2.06%	80.54%
11	KVK-Tech, Inc.	150,397,089	1.99%	82.53%
12	Alvogen, Inc.	126,384,513	1.67%	84.21%
13	Teva	98,240,041	1.30%	85.51%
14	Akorn Operating Company LLC	97,404,751	1.29%	86.80%
15	Apotex Corp.	78,661,146	1.04%	87.84%
16	VistaPharm, LLC	73,882,929	0.98%	88.82%
17	Endo Pharmaceuticals Inc.	63,689,375	0.84%	89.66%
18	Aurolife Pharma LLC	58,465,317	0.77%	90.44%
19	Orexo US, Inc.	55,907,370	0.74%	91.18%
20	Hospira, Inc.	51,421,893	0.68%	91.86%

B. Defendants' Shipment Summary

91. In addition to receiving the ARCOS Data produced by the DEA, I received Transactional Data produced in discovery by Kroger and Publix.[33] I analyzed the Defendants' Transactional Data and found that there are small

[33] Kroger provided distribution data from August 2009 to October 2014 including only hydrocodone, and September 2017 to May 2018 including buprenorphine and codeine. Publix provided distribution data from December 2005 to June 2019.

gaps in the data produced by Defendants. I matched transactions in each Defendant's Transactional Data to the ARCOS Data based on NDC, Buyer's DEA Number, Quantity, and the transaction date (within ±5 days). After matching the transactions, I converted the transaction Quantity to both Dosage Units and MME.

92. Table 16 presents summary statistics comparing the ARCOS Data and the Defendants' Transactional Data. The transactions summarized in Table 16 consist of hydrocodone shipments to Dispensers in Cobb County from August 2009 to October 2014 and buprenorphine and codeine shipments from September 2017 to May 2018 for Kroger, and 14 drugs shipments from January 1, 2006 through December 31, 2019 for Publix.

Table 16 Overlap between ARCOS Data and Defendant Data

	Transactions in Both Datasets		**Transactions Only in ARCOS**				**Transactions Only in Defendants**			
Defendant	Dosage Unit	MME	Dosage Unit	%	MME	%	Dosage Unit	%	MME	%
Kroger	6,891,760	38,546,773	20,000	0.29%	105,660	0.27%	30,200	0.44%	157,664	0.41%
Publix	16,632,503	138,613,035	0	0.00%	0	0.00%	108,440	0.65%	533,544	0.38%
Total	**23,524,263**	**177,159,808**	**20,000**	**0.09%**	**105,660**	**0.06%**	**138,640**	**0.59%**	**691,208**	**0.39%**

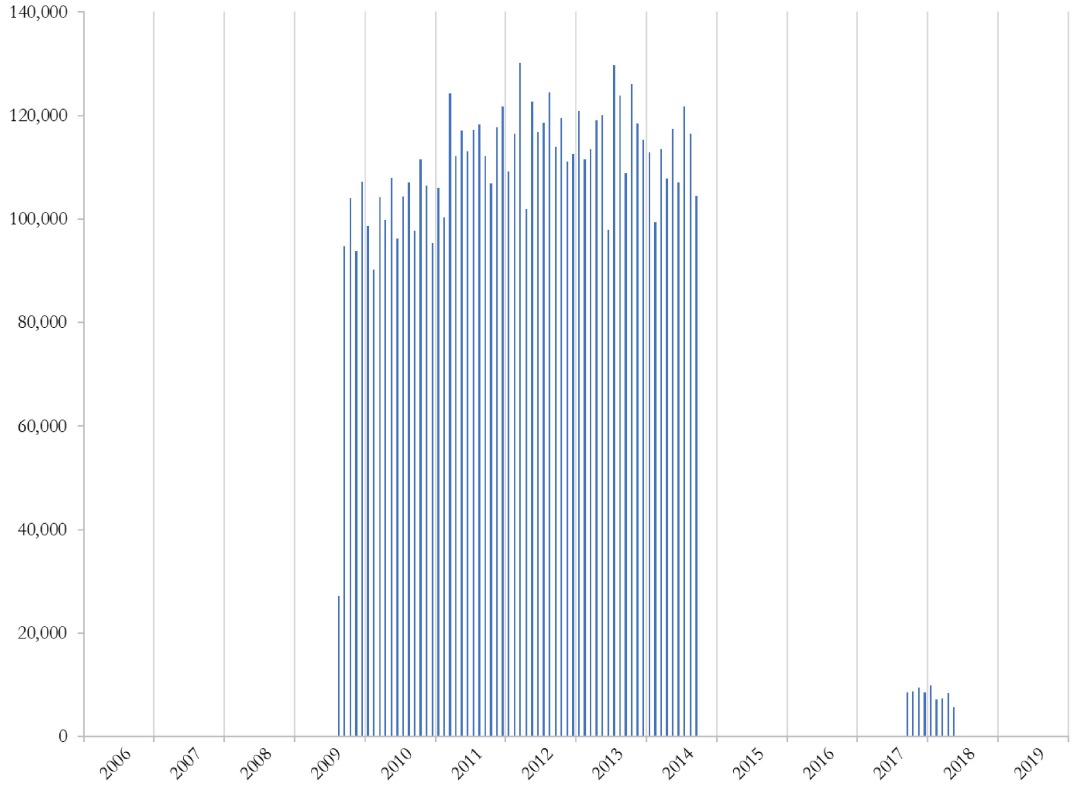
93. Using my matching criteria, over 99.4% of all Dosage Units or MME in either the ARCOS Data or the datasets produced by Defendants are in both the ARCOS Data and the datasets produced by Defendants (*i.e.*, the MME and Dosage Units are in the intersection of the ARCOS Data and the datasets produced by Defendants).

94. The 99.4% overlap between the ARCOS Data and the datasets produced by Defendants demonstrates that the ARCOS Data and the datasets produced by Defendants in discovery are both reliable. The remainder of this section explains the slight differences between the ARCOS Data and the Defendants' data.

1. Kroger

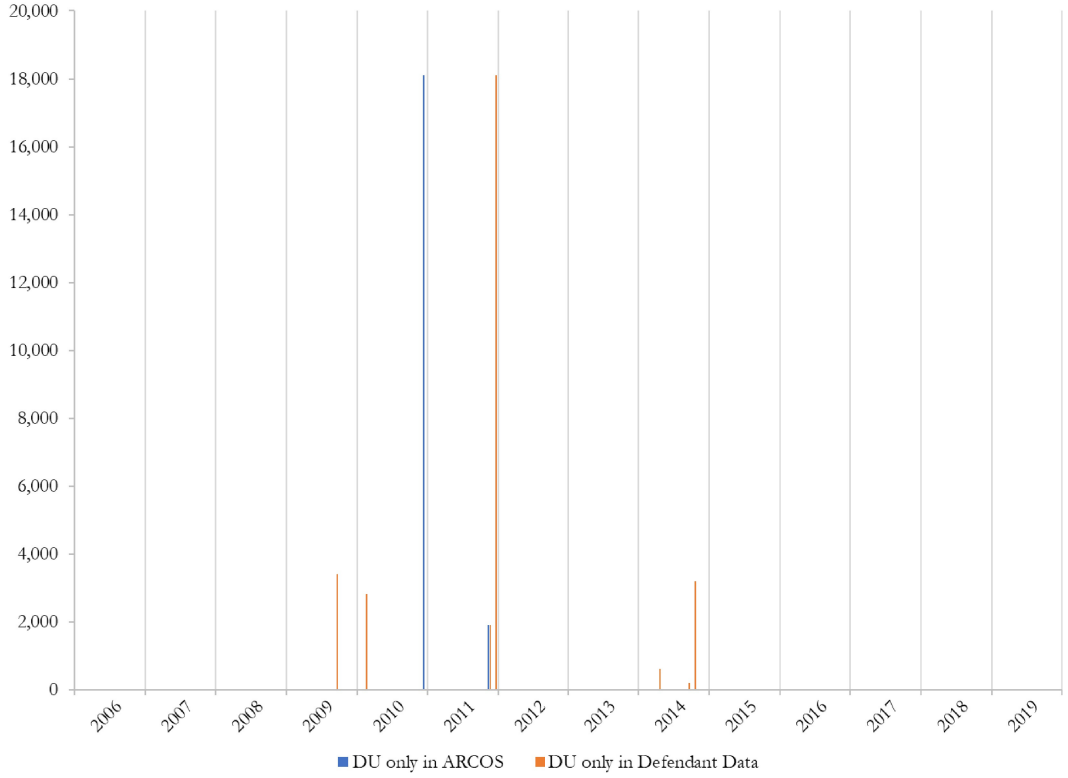
95. Figure 2 shows the matched Dosage Units reported each month in the ARCOS Data and in Kroger's Transactional Data in Cobb County.

Figure 2 Dosage Units Reported in the ARCOS Data and Kroger's Transactional Data, January 2006 through December 2019



96. Figure 3 shows the Dosage Units reported only in the ARCOS data and only in Kroger's Transactional Data in Cobb County.

Figure 3 Dosage Units Reported only in the ARCOS Data and only in Kroger's Transactional Data, January 2006 through December 2019



97. Table 17 summarizes the results of matching ARCOS Data and Kroger's Transactional Data. 99.6% of the Dosage Units and MME reported in transactions in either the ARCOS data or Kroger's Transactional Data are reported in both the ARCOS Data and Kroger's Transactional Data.

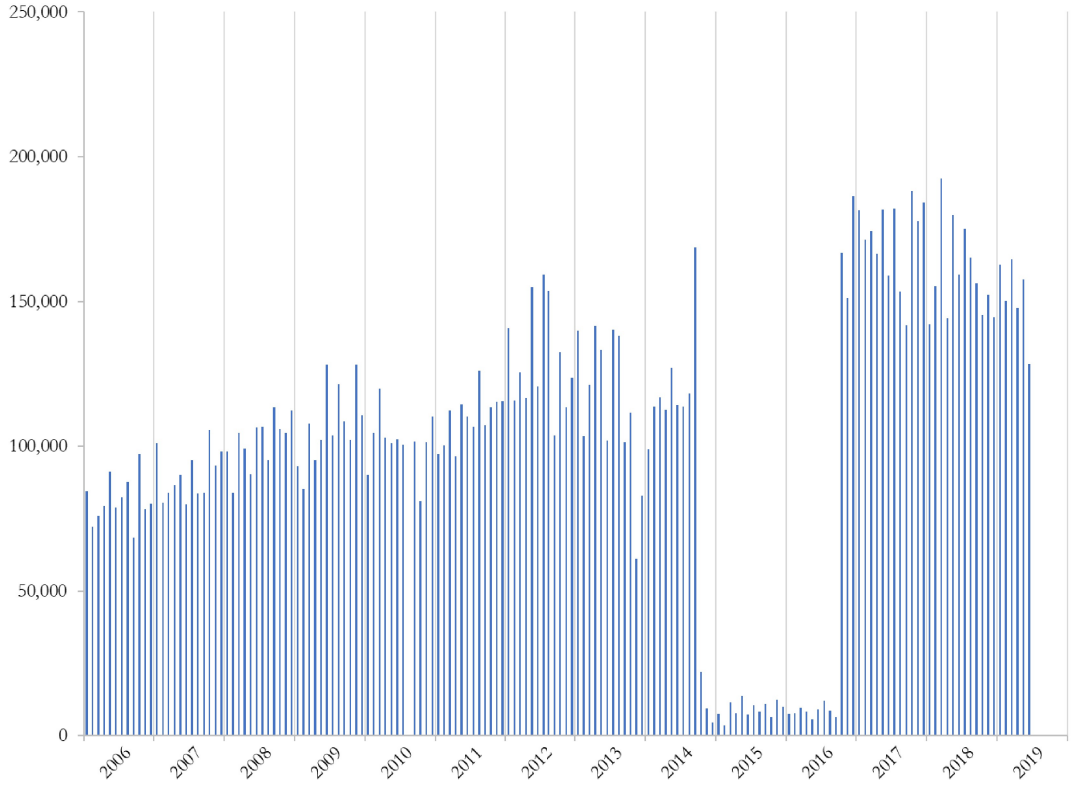
Table 17 Comparison by Drug code in ARCOS Data vs. Kroger's Transactional Data

	Matched DU	Matched MME	Only in ARCOS				Only in Defendant Data			
Base Drug	**DU**	**MME**	**DU**	**%**	**MME**	**%**	**DU**	**%**	**MME**	**%**
Buprenorphine	6,590	4,662,390	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Codeine	67,400	246,979	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dihydrocodeine	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fentanyl	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Hydrocodone	6,817,770	33,637,405	20,000	0.29%	105,660	0.31%	30,200	0.44%	157,664	0.47%
Hydromorphone	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Levorphanol	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Meperidine	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Methadone	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Morphine	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Opium	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Oxycodone	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Oxymorphone	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Tapentadol	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	**6,891,760**	**38,546,773**	**20,000**	**0.29%**	**105,660**	**0.27%**	**30,200**	**0.44%**	**157,664**	**0.41%**

2. Publix

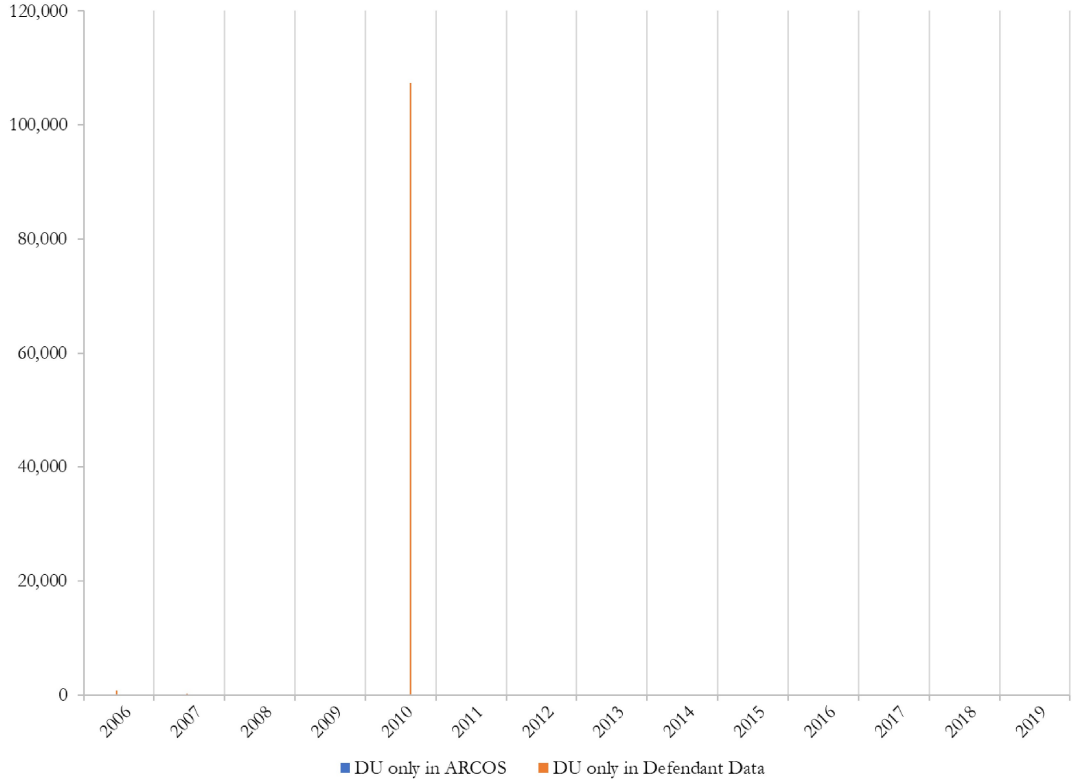
98. Figure 4 shows the matched Dosage Units reported each month in the ARCOS Data and in Publix's Transactional Data in Cobb County.

Figure 4 Dosage Units Reported in the ARCOS Data and Publix's Transactional Data, January 2006 through December 2019



99. Figure 5 shows the Dosage Units reported only in the ARCOS data and only in Publix's Transactional Data in Cobb County.

Figure 5 Dosage Units Reported only in the ARCOS Data and only in Publix's Transactional Data, January 2006 through December 2019



100. Table 18 summarizes the results of matching ARCOS Data and Publix's Transactional Data. 99.4% of the Dosage Units or 99.6% of the MME reported in transactions in either the ARCOS data or Publix's Transactional Data are reported in both the ARCOS Data and Publix's Transactional Data.

Table 18 Comparison by Drug code in ARCOS Data vs. Publix's Transactional Data

	Matched DU	Matched MME	Only in ARCOS				Only in Defendant Data			
Base Drug	**DU**	**MME**	**DU**	**%**	**MME**	**%**	**DU**	**%**	**MME**	**%**
Buprenorphine	48,804	16,217,700	0	0.00%	0	0.00%	120	0.25%	28,800	0.18%
Codeine	943,130	3,315,980	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dihydrocodeine	210	1,122	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fentanyl	19,885	10,007,190	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Hydrocodone	12,697,170	60,646,473	0	0.00%	0	0.00%	108,200	0.85%	498,131	0.82%
Hydromorphone	77,600	1,126,854	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Levorphanol	0	0	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Meperidine	2,800	12,201	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Methadone	96,400	2,416,222	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Morphine	244,000	5,718,323	0	0.00%	0	0.00%	0	0.00%	189	0.00%
Opium	24	720	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Oxycodone	2,452,700	37,262,686	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Oxymorphone	12,420	434,363	0	0.00%	0	0.00%	120	0.97%	6,423	1.48%
Tapentadol	37,360	1,453,200	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	**16,632,503**	**138,613,035**	**0**	**0.00%**	**0**	**0.00%**	**108,440**	**0.65%**	**533,544**	**0.38%**

C. Opioid Shipment Market Share

101. In this section, I summarize shipments of the 14 opioid drugs to NPI defined Chain and Retail Pharmacies in Cobb County using the ARCOS Data supplemented with Defendants' Transactional Data.

102. Table 19 shows that Distributor Defendants' shipments of the 14 opioid drugs in Dosage Units account for 10.5% of the total Dosage Units shipped to Chain and Retail Pharmacies in Cobb County.

Table 19 Distributors to Chain and Retail Pharmacies in Cobb County, 2006-2019

Distributor	Dosage Units	Percent
Cardinal Health	57,028,412	20.5%
McKesson Corporation	55,540,992	20.0%
AmerisourceBergen Drug	49,099,208	17.7%
Walgreens	28,423,328	10.2%
Publix	17,818,048	6.4%
CVS	17,568,530	6.3%
Walmart	13,711,729	4.9%
Kroger	11,391,722	4.1%
Subtotal	**250,581,969**	**90.2%**
Other Distributors	27,198,257	9.8%
Total	**277,780,226**	**100.0%**

103. Table 20 lists the shipments by Pharmacy of the 14 opioid drugs to Chain and Retail Pharmacies in Cobb County in Dosage Units.

Table 20 Shipments to Chain and Retail Pharmacies in Cobb County, 2006-2019

Pharmacy	Dosage Units	Percent
Walgreens	53,820,870	19.4%
CVS	50,239,678	18.1%
Publix	33,210,266	12.0%
Kroger	29,848,833	10.7%
Other Chain Pharmacies	49,778,098	17.9%
Chain Pharmacies Total	**216,897,745**	**78.1%**
Retail Pharmacies	60,882,481	21.9%
Total	**277,780,226**	**100.0%**

VII. Distributor Suspicious Order Monitoring System (SOMS) Methods

104. I implemented various approaches to identify transactions meeting specified criteria using the non-public ARCOS Data from 2006 to 2019, supplemented with Defendants' Transactional Data where the ARCOS Data is obviously missing transactions that are included in the transactions produced by Defendants in discovery and to the extent I have Defendants' Transactional Data for the periods before 2006 and after 2019. I calculated the results separately for each of fourteen controlled substance drug codes. I included the detailed transaction data with flagged indicators in Appendix 10C, and additional summaries, charts, and graphs may be created using these files, consistent with any court order.

A. Trailing Six-month Maximum Monthly Threshold

Method 1: Trailing Six-month Maximum Monthly Threshold

105. Under Method 1, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed the highest number of Dosage Units shipped by the Distributor Defendant to the pharmacy in any one of the six preceding calendar months. For example, if the number of Dosage Units containing hydrocodone shipped from a Distributor Defendant to a pharmacy in February, March, April, May, June, and July was 5,000; 10,000; 7,000; 8,000; 9,000; and 9,500 respectively, a requested transaction in August would be flagged if it would cause the number of Dosage Units containing hydrocodone the Distributor Defendant shipped to the pharmacy to exceed 10,000.

106. Under this Method, the first shipment of a month is less likely to be flagged than the last order of the same month. If the total monthly Dosage Units keep increasing, the threshold will increase.

Method 2: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold

107. Under Method 2, when a transaction causes the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed the highest number of Dosage Units shipped by the Distributor Defendant to the pharmacy in any one of the six preceding months, the Dosage Units of the highest month in the preceding six months becomes threshold which is then applied in all subsequent months.

108. Under this Method, the first shipment of a month is still less likely to be flagged than the last order of the same month, but the threshold won't change once it is triggered.

Method 7: Trailing Six-month Maximum Monthly Threshold on Rolling 30-Day Dosage Units

109. Under Method 7, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a rolling 30-day window to exceed the highest number of Dosage Units shipped by the Distributor Defendant to the pharmacy in any one of the six preceding calendar months.[34]

[34] A rolling 30-day window in my calculation includes today and the prior 29 days. *See*, CAH_MDL2804_01423521 at 3582.

110. Under this Method, the impact of the calendar month is removed. Similar to Method 1, the threshold will increase if the total monthly Dosage Units keep increasing.

Method 2b: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units

111. Under Method 2b, when a transaction causes the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a rolling 30-day window to exceed the highest number of Dosage Units shipped by the Distributor Defendant to the pharmacy in any one of the six preceding months, the Dosage Units of the highest month in the preceding six months becomes the threshold which is then applied in all subsequent months.

112. Under this Method, the impact of the calendar month is removed and the threshold won't change once it is triggered.

B. Trailing 12 Month National Average Threshold

Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

113. Under Method 3, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed twice the trailing twelve-month average Dosage Units to retail and chain pharmacies served by the Distributor Defendant.

114. Under this Method, the first shipment of a month is less likely to be flagged than the last order of the same month. If the national average of opioid shipments keeps increasing, the threshold will increase.

Method 3b: Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

115. Under Method 3b, when a transaction causes the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a rolling 30-day window to exceed twice the trailing twelve-month average Dosage Units to retail and chain pharmacies served by the Distributor Defendant, the Dosage Units of twice the trailing twelve-month average to retail and chain pharmacies served by the Distributor Defendant becomes threshold which is then applied in all subsequent months.

116. Under this Method, the impact of the calendar month is removed and the threshold won't change once it is triggered.

Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

117. Under Method 4, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed three times the trailing twelve-month average Dosage Units to retail and chain pharmacies served by the Distributor Defendant.

118. Under this Method, the first shipment of a month is less likely to be flagged than the last order of the same month. If the national average of opioid shipments keeps increasing, the threshold will increase.

Method 4b: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

119. Under Method 4b, when a transaction causes the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a rolling 30-day window to exceed three times the trailing twelve-month average

Dosage Units to retail and chain pharmacies served by the Distributor Defendant, the Dosage Units of three times the trailing twelve-month average to retail and chain pharmacies served by the Distributor Defendant becomes threshold which is then applied in all subsequent months.

120. Under this Method, the impact of the calendar month is removed and the threshold won't change once it is triggered.

C. Monthly 8,000 Dosage Units Threshold

Method 5: Monthly 8,000 Dosage Units

121. Under Method 5, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed 8,000 Dosage Units.[35] Under this Method, the first shipment of a month is less likely to be flagged than the last order of the same month.

D. Daily Dosage Units Threshold

Method 6: Daily Dosage Units

122. Under Method 6, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a day to exceed a specified number of Dosage Units that varies by drug type and within some drug types by formulation.[36]

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[35] McKesson Operations Manual for Pharma Distribution dated May 16, 2007 shows the dosage threshold of 8,000 on oxycodone or hydrocodone (MCKMDL00355251).

[36] Maximum Daily Dosage Units used as specified in Cardinal Health DEA Compliance Manual CAH_MDL_PRIORPROD_DEA07_01383895 at CAH_MDLPRIORPRO_DEA07_01384160.

E. Summary of Nonrecurrent Flagged Transactions

Method 1: Trailing Six-month Maximum Monthly Threshold

123. Table 21 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-month Maximum Threshold.

Table 21 Trailing Six-month Maximum Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	217,273	2.4%
2007	9,861,344	351,829	3.6%
2008	12,313,261	565,023	4.6%
2009	15,702,117	464,075	3.0%
2010	15,404,954	369,812	2.4%
2011	16,780,151	446,600	2.7%
2012	19,004,469	502,436	2.6%
2013	20,561,479	428,477	2.1%
2014	19,388,239	593,859	3.1%
2015	9,697,605	34,809	0.4%
2016	14,788,497	139,952	0.9%
2017	40,147,356	507,667	1.3%
2018	36,652,249	390,078	1.1%
2019	35,240,284	554,058	1.6%
Total	**274,528,462**	**5,565,949**	**2.0%**

124. Table 22 summarizes the Dosage Units of the transactions flagged based on the Trailing Six-month Maximum Threshold Approach in Cobb County.

Table 22 Trailing Six-month Maximum Threshold Flagged Transactions 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	279,720	n/a	n/a	n/a	39,900	**319,620**
Publix	66,000	601,510	600	0	0	87,500	**755,610**
Total	**66,000**	**881,230**	**600**	**0**	**0**	**127,400**	**1,075,230**

Method 2: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold

125. Table 23 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-Month Maximum, Fixed After Triggered Threshold.

Table 23 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	306,676	3.4%
2007	9,861,344	1,205,710	12.2%
2008	12,313,261	2,563,539	20.8%
2009	15,702,117	3,406,252	21.7%
2010	15,404,954	3,658,989	23.8%
2011	16,780,151	4,474,450	26.7%
2012	19,004,469	5,635,188	29.7%
2013	20,561,479	5,011,301	24.4%
2014	19,388,239	3,710,486	19.1%
2015	9,697,605	100,946	1.0%
2016	14,788,497	241,412	1.6%
2017	40,147,356	1,168,951	2.9%
2018	36,652,249	1,530,884	4.2%
2019	35,240,284	1,374,106	3.9%
Total	**274,528,462**	**34,388,890**	**12.5%**

126. Table 24 summarizes the Dosage Units of the transactions flagged based on the Trailing Six-Month Maximum, Fixed After Triggered Threshold Approach in Cobb County.

Table 24 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	3,316,370	n/a	n/a	n/a	106,500	**3,422,870**
Publix	171,900	3,023,510	700	0	0	208,600	**3,404,710**
Total	**171,900**	**6,339,880**	**700**	**0**	**0**	**315,100**	**6,827,580**

Method 7: Trailing Six-month Maximum Monthly Threshold on Rolling 30-Day Dosage Units

127. Table 25 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units.

Table 25 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	1,029,626	11.5%
2007	9,861,344	2,033,708	20.6%
2008	12,313,261	2,827,312	23.0%
2009	15,702,117	2,445,017	15.6%
2010	15,404,954	2,391,978	15.5%
2011	16,780,151	3,183,332	19.0%
2012	19,004,469	2,850,037	15.0%
2013	20,561,479	2,545,370	12.4%
2014	19,388,239	2,508,055	12.9%
2015	9,697,605	86,371	0.9%
2016	14,788,497	414,385	2.8%
2017	40,147,356	2,266,305	5.6%
2018	36,652,249	2,072,141	5.7%
2019	35,240,284	3,137,934	8.9%
Total	**274,528,462**	**29,791,572**	**10.9%**

128. Table 26 summarizes the Dosage Units of the transactions flagged based on the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Approach in Cobb County.

Table 26 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	1,800,690	n/a	n/a	n/a	79,900	**1,880,590**
Publix	356,600	3,085,870	7,000	200	0	191,200	**3,640,870**
Total	**356,600**	**4,886,560**	**7,000**	**200**	**0**	**271,100**	**5,521,460**

Method 2b: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units

129. Table 27 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units.

Table 27 Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	1,441,454	16.1%
2007	9,861,344	4,705,924	47.7%
2008	12,313,261	7,853,522	63.8%
2009	15,702,117	9,459,298	60.2%
2010	15,404,954	9,924,736	64.4%
2011	16,780,151	11,435,599	68.1%
2012	19,004,469	13,015,450	68.5%
2013	20,561,479	11,843,387	57.6%
2014	19,388,239	8,883,670	45.8%
2015	9,697,605	196,599	2.0%
2016	14,788,497	454,234	3.1%
2017	40,147,356	3,443,474	8.6%
2018	36,652,249	4,773,661	13.0%
2019	35,240,284	4,442,797	12.6%
Total	**274,528,462**	**91,873,806**	**33.5%**

130. Table 28 summarizes the Dosage Units of the transactions flagged based on the Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units Approach in Cobb County.

Table 28 Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30-Day Dosage Units Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	8,328,000	n/a	n/a	n/a	142,200	**8,470,200**
Publix	572,700	8,421,420	6,700	200	0	351,900	**9,352,920**
Total	**572,700**	**16,749,420**	**6,700**	**200**	**0**	**494,100**	**17,823,120**

Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

131. Table 29 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

Table 29 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	12,554	0.1%
2008	12,313,261	183,313	1.5%
2009	15,702,117	292,463	1.9%
2010	15,404,954	76,354	0.5%
2011	16,780,151	119,933	0.7%
2012	19,004,469	99,164	0.5%
2013	20,561,479	191,713	0.9%
2014	19,388,239	189,684	1.0%
2015	9,697,605	59,100	0.6%
2016	14,788,497	877,729	5.9%
2017	40,147,356	734,420	1.8%
2018	36,652,249	359,334	1.0%
2019	35,240,284	589,815	1.7%
Total	**274,528,462**	**3,785,575**	**1.4%**

132. Table 30 summarizes the Dosage Units of the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cobb County.

Table 30 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	5,198	**5,198**
Publix	75,500	64,900	1,900	400	0	54,938	**197,638**
Total	**75,500**	**64,900**	**1,900**	**400**	**0**	**60,136**	**202,836**

Method 3b: Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

133. Table 31 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days.

Table 31 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	6,403	0.1%
2007	9,861,344	128,752	1.3%
2008	12,313,261	784,022	6.4%
2009	15,702,117	2,118,811	13.5%
2010	15,404,954	1,432,354	9.3%
2011	16,780,151	1,399,627	8.3%
2012	19,004,469	1,684,470	8.9%
2013	20,561,479	2,414,255	11.7%
2014	19,388,239	2,383,075	12.3%
2015	9,697,605	2,408,629	24.8%
2016	14,788,497	4,857,796	32.8%
2017	40,147,356	18,473,970	46.0%
2018	36,652,249	17,141,542	46.8%
2019	35,240,284	16,390,702	46.5%
Total	**274,528,462**	**71,624,407**	**26.1%**

134. Table 32 summarizes the Dosage Units of the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days in Cobb County.

Table 32 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	87,610	**87,610**
Publix	2,343,900	1,422,460	36,300	700	0	231,473	**4,034,833**
Total	**2,343,900**	**1,422,460**	**36,300**	**700**	**0**	**319,083**	**4,122,443**

Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

135. Table 33 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

Table 33 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	0	0.0%
2008	12,313,261	21,600	0.2%
2009	15,702,117	32,115	0.2%
2010	15,404,954	0	0.0%
2011	16,780,151	22,212	0.1%
2012	19,004,469	0	0.0%
2013	20,561,479	0	0.0%
2014	19,388,239	0	0.0%
2015	9,697,605	0	0.0%
2016	14,788,497	457,016	3.1%
2017	40,147,356	82,856	0.2%
2018	36,652,249	0	0.0%
2019	35,240,284	153,600	0.4%
Total	**274,528,462**	**769,399**	**0.3%**

136. Table 34 summarizes the Dosage Units of the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cobb County.

Table 34 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	180	**180**
Publix	25,100	11,000	300	0	0	10,133	**46,533**
Total	**25,100**	**11,000**	**300**	**0**	**0**	**10,313**	**46,713**

Method 4b: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

137. Table 35 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days.

Table 35 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	0	0.0%
2008	12,313,261	189,000	1.5%
2009	15,702,117	570,315	3.6%
2010	15,404,954	154,800	1.0%
2011	16,780,151	156,544	0.9%
2012	19,004,469	104,054	0.5%
2013	20,561,479	136,816	0.7%
2014	19,388,239	175,818	0.9%
2015	9,697,605	147,775	1.5%
2016	14,788,497	2,059,251	13.9%
2017	40,147,356	12,453,427	31.0%
2018	36,652,249	10,337,705	28.2%
2019	35,240,284	9,796,591	27.8%
Total	**274,528,462**	**36,282,096**	**13.2%**

138. Table 36 summarizes the Dosage Units of the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days in Cobb County.

Table 36 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	14,772	**14,772**
Publix	1,660,700	785,760	21,400	0	0	202,573	**2,670,433**
Total	**1,660,700**	**785,760**	**21,400**	**0**	**0**	**217,345**	**2,685,205**

Method 5: Monthly 8,000 Dosage Units

139. Table 37 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Monthly 8,000 Dosage Units Threshold.

Table 37 Monthly 8,000 Dosage Units Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	3,178	0.0%
2007	9,861,344	16,194	0.2%
2008	12,313,261	179,195	1.5%
2009	15,702,117	443,610	2.8%
2010	15,404,954	607,709	3.9%
2011	16,780,151	992,393	5.9%
2012	19,004,469	1,166,054	6.1%
2013	20,561,479	1,038,140	5.0%
2014	19,388,239	748,858	3.9%
2015	9,697,605	0	0.0%
2016	14,788,497	31,938	0.2%
2017	40,147,356	424,269	1.1%
2018	36,652,249	413,174	1.1%
2019	35,240,284	0	0.0%
Total	**274,528,462**	**6,064,714**	**2.2%**

140. Table 38 summarizes the Dosage Units of the transactions flagged based on the Monthly 8,000 Dosage Units Threshold Approach in Cobb County.

Table 38 Monthly 8,000 Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	928,950	n/a	n/a	n/a	0	**928,950**
Publix	45,500	121,180	0	0	0	0	**166,680**
Total	**45,500**	**1,050,130**	**0**	**0**	**0**	**0**	**1,095,630**

Method 6: Daily Dosage Units

141. Table 39 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Daily Dosage Units Threshold.

Table 39 Daily Dosage Units Threshold Flagged Transactions, Total MME and % MME, nonrecurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	3,784	10.3%
2006	8,934,324	2,461,374	27.5%
2007	9,820,543	3,166,965	32.2%
2008	11,193,357	4,434,358	39.6%
2009	11,957,294	5,558,269	46.5%
2010	12,021,039	5,723,543	47.6%
2011	12,996,841	6,378,009	49.1%
2012	14,460,756	7,460,582	51.6%
2013	13,681,743	7,460,430	54.5%
2014	10,452,146	6,541,498	62.6%
2015	658,245	0	0.0%
2016	5,410,230	1,196,385	22.1%
2017	21,382,802	4,323,578	20.2%
2018	20,630,983	3,928,332	19.0%
2019	19,149,984	3,532,641	18.4%
Total	**172,786,969**	**62,169,747**	**36.0%**

142. Table 40 summarize the Dosage Units of the transactions flagged based on the Daily Dosage Units Threshold Approach in Cobb County.

Table 40 Daily Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	4,302,100	n/a	n/a	n/a	600	**4,302,700**
Publix	67,700	8,554,910	0	0	n/a	0	**8,622,610**
Total	**67,700**	**12,857,010**	**0**	**0**	**n/a**	**600**	**12,925,310**

F. Summary of Recurrent Flagged Transactions

Method 1 (2): Trailing Six-month Maximum Monthly Threshold

143. Table 41 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-Month Maximum Threshold. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 41 Trailing Six-Month Maximum Threshold Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	1,365,347	15.3%
2007	9,861,344	8,791,918	89.2%
2008	12,313,261	11,055,582	89.8%
2009	15,702,117	11,867,467	75.6%
2010	15,404,954	12,018,837	78.0%
2011	16,780,151	12,962,695	77.3%
2012	19,004,469	14,166,254	74.5%
2013	20,561,479	13,651,078	66.4%
2014	19,388,239	10,412,364	53.7%
2015	9,697,605	587,964	6.1%
2016	14,788,497	1,704,050	11.5%
2017	40,147,356	7,878,102	19.6%
2018	36,652,249	16,878,546	46.1%
2019	35,240,284	17,237,743	48.9%
Total	**274,528,462**	**140,577,947**	**51.2%**

144. Table 42 summarizes the Dosage Units of transactions flagged based on the Trailing Six-Month Maximum Threshold Approach in Cobb County.

Table 42 Trailing Six-Month Maximum Threshold Flagged Transactions 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	9,446,990	n/a	n/a	n/a	587,600	**10,034,590**
Publix	1,845,900	12,346,940	25,200	0	0	944,330	**15,162,370**
Total	**1,845,900**	**21,793,930**	**25,200**	**0**	**0**	**1,531,930**	**25,196,960**

Method 2b (7): Trailing Six-month Maximum Monthly Threshold on Rolling 30-Day Dosage Units

145. Table 43 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 43 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	3,186,893	35.6%
2007	9,861,344	9,583,888	97.2%
2008	12,313,261	11,111,166	90.2%
2009	15,702,117	11,933,947	76.0%
2010	15,404,954	12,045,193	78.2%
2011	16,780,151	12,999,493	77.5%
2012	19,004,469	14,227,283	74.9%
2013	20,561,479	13,680,749	66.5%
2014	19,388,239	10,762,033	55.5%
2015	9,697,605	2,145,423	22.1%
2016	14,788,497	2,961,834	20.0%
2017	40,147,356	13,537,364	33.7%
2018	36,652,249	19,493,671	53.2%
2019	35,240,284	18,240,227	51.8%
Total	**274,528,462**	**155,909,163**	**56.8%**

146. Table 44 summarizes the Dosage Units of the transactions flagged based on the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Approach in Cobb County.

Table 44 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	9,668,090	n/a	n/a	n/a	657,468	**10,325,558**
Publix	2,188,400	12,635,240	79,800	11,000	0	1,012,030	**15,926,470**
Total	**2,188,400**	**22,303,330**	**79,800**	**11,000**	**0**	**1,669,498**	**26,252,028**

Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

147. Table 45 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 45 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	75,535	0.8%
2008	12,313,261	971,679	7.9%
2009	15,702,117	2,406,358	15.3%
2010	15,404,954	2,113,872	13.7%
2011	16,780,151	1,906,811	11.4%
2012	19,004,469	2,972,034	15.6%
2013	20,561,479	4,655,738	22.6%
2014	19,388,239	6,078,433	31.4%
2015	9,697,605	4,904,792	50.6%
2016	14,788,497	9,193,771	62.2%
2017	40,147,356	26,644,504	66.4%
2018	36,652,249	24,759,496	67.6%
2019	35,240,284	22,789,711	64.7%
Total	**274,528,462**	**109,472,736**	**39.9%**

148. Table 46 summarizes the Dosage Units of the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cobb County.

Table 46 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	233,828	**233,828**
Publix	2,486,600	3,293,310	36,100	11,400	0	737,072	**6,564,482**
Total	**2,486,600**	**3,293,310**	**36,100**	**11,400**	**0**	**970,900**	**6,798,310**

Method 3b: Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

149. Table 47 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 47 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	16,016	0.2%
2007	9,861,344	851,641	8.6%
2008	12,313,261	1,706,466	13.9%
2009	15,702,117	3,415,282	21.8%
2010	15,404,954	3,142,859	20.4%
2011	16,780,151	3,161,435	18.8%
2012	19,004,469	5,478,121	28.8%
2013	20,561,479	7,571,978	36.8%
2014	19,388,239	7,687,893	39.7%
2015	9,697,605	5,126,080	52.9%
2016	14,788,497	9,693,335	65.5%
2017	40,147,356	28,512,225	71.0%
2018	36,652,249	25,861,101	70.6%
2019	35,240,284	24,512,749	69.6%
Total	**274,528,462**	**126,737,179**	**46.2%**

150. Table 48 summarizes the Dosage Units of the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days in Cobb County.

Table 48 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	337,732	**337,732**
Publix	2,486,600	5,061,080	63,800	12,600	0	826,431	**8,450,511**
Total	**2,486,600**	**5,061,080**	**63,800**	**12,600**	**0**	**1,164,163**	**8,788,243**

Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

151. Table 49 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 49 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	0	0.0%
2008	12,313,261	189,000	1.5%
2009	15,702,117	582,915	3.7%
2010	15,404,954	356,732	2.3%
2011	16,780,151	565,111	3.4%
2012	19,004,469	283,625	1.5%
2013	20,561,479	372,109	1.8%
2014	19,388,239	281,888	1.5%
2015	9,697,605	381,772	3.9%
2016	14,788,497	3,013,602	20.4%
2017	40,147,356	13,188,607	32.9%
2018	36,652,249	11,970,372	32.7%
2019	35,240,284	11,726,264	33.3%
Total	**274,528,462**	**42,911,998**	**15.6%**

152. Table 50 summarizes the Dosage Units of the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cobb County.

Table 50 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	16,356	**16,356**
Publix	1,853,300	992,980	35,600	0	0	248,243	**3,130,123**
Total	**1,853,300**	**992,980**	**35,600**	**0**	**0**	**264,599**	**3,146,479**

Method 4b: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

153. Table 51 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Unit, Fixed After First Triggered Threshold on Rolling 30 Days. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 51 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	0	0.0%
2007	9,861,344	0	0.0%
2008	12,313,261	189,000	1.5%
2009	15,702,117	1,193,115	7.6%
2010	15,404,954	993,932	6.5%
2011	16,780,151	1,039,205	6.2%
2012	19,004,469	720,425	3.8%
2013	20,561,479	815,509	4.0%
2014	19,388,239	1,320,788	6.8%
2015	9,697,605	3,114,322	32.1%
2016	14,788,497	5,707,002	38.6%
2017	40,147,356	17,333,833	43.2%
2018	36,652,249	15,813,897	43.1%
2019	35,240,284	14,674,929	41.6%
Total	**274,528,462**	**62,915,958**	**22.9%**

154. Table 52 summarizes the Dosage Units of the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days in Cobb County.

Table 52 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	0	n/a	n/a	n/a	80,636	**80,636**
Publix	1,853,300	992,980	35,600	0	0	271,243	**3,153,123**
Total	**1,853,300**	**992,980**	**35,600**	**0**	**0**	**351,879**	**3,233,759**

Method 5: Monthly 8,000 Dosage Units

155. Table 53 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Monthly 8,000 Dosage Units Threshold. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 53 Monthly 8,000 Dosage Units Threshold Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	0	0.0%
2006	8,949,777	44,222	0.5%
2007	9,861,344	470,790	4.8%
2008	12,313,261	1,236,027	10.0%
2009	15,702,117	2,874,881	18.3%
2010	15,404,954	4,632,478	30.1%
2011	16,780,151	5,473,746	32.6%
2012	19,004,469	7,160,548	37.7%
2013	20,561,479	7,699,644	37.4%
2014	19,388,239	5,750,676	29.7%
2015	9,697,605	0	0.0%
2016	14,788,497	678,761	4.6%
2017	40,147,356	4,255,563	10.6%
2018	36,652,249	4,110,365	11.2%
2019	35,240,284	3,114,033	8.8%
Total	**274,528,462**	**47,501,735**	**17.3%**

156. Table 54 summarizes the Dosage Units of the transactions flagged based on the Monthly 8,000 Dosage Units Threshold Approach in Cobb County.

Table 54 Monthly 8,000 Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	5,325,310	n/a	n/a	n/a	0	**5,325,310**
Publix	292,200	3,280,300	0	0	0	0	**3,572,500**
Total	**292,200**	**8,605,610**	**0**	**0**	**0**	**0**	**8,897,810**

Method 6: Daily Dosage Units

157. Table 55 reports Total MME and % of Total MME in transactions flagged in Cobb County using the Daily Dosage Units Threshold. Once an order(s) in any day exceeds the threshold all subsequent orders of the same drug are flagged.

Table 55 Daily Dosage Units Threshold Flagged Transactions, Total MME and % MME, recurrent

Year	Defendants' Total MME	Flagged MME	%
2005	36,679	3,784	10.3%
2006	8,934,324	7,695,477	86.1%
2007	9,820,543	9,423,278	96.0%
2008	11,193,357	10,794,459	96.4%
2009	11,957,294	11,531,311	96.4%
2010	12,021,039	11,834,681	98.4%
2011	12,996,841	12,702,268	97.7%
2012	14,460,756	13,961,382	96.5%
2013	13,681,743	13,213,147	96.6%
2014	10,452,146	9,988,898	95.6%
2015	658,245	12,929	2.0%
2016	5,410,230	1,618,104	29.9%
2017	21,382,802	9,299,997	43.5%
2018	20,630,983	9,999,406	48.5%
2019	19,149,984	10,380,128	54.2%
Total	**172,786,969**	**132,459,249**	**76.7%**

158. Table 56 summarizes the Dosage Units of the transactions flagged based on the Daily Dosage Units Threshold Approach in Cobb County.

Table 56 Daily Dosage Units Threshold Flagged Transactions, 2005 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	n/a	10,144,410	n/a	n/a	n/a	17,300	**10,161,710**
Publix	1,099,000	13,149,240	0	0	n/a	0	**14,248,240**
Total	**1,099,000**	**23,293,650**	**0**	**0**	**n/a**	**17,300**	**24,409,950**

VIII. Chain Pharmacy SOMS Methods

159. I have been asked by Counsel to assume that Chain Pharmacy Defendants may have had knowledge of - or information available to inform them of - opioid shipments from all Distributors to their pharmacies. I have re-run the flagging routines described in Section VII assuming that Chain Pharmacy Defendants could have flagged transactions based on this expanded information set and report the results in this section. I calculated the results separately for each of fourteen controlled substance drug codes. I included the detailed transaction data with flagged indicators in Appendix 10C, and additional summaries, charts, and graphs may be created using these files, consistent with any court order.

A. Summary of Nonrecurrent Flagged Transactions

Method 1: Trailing Six-month Maximum Monthly Threshold

160. Table 57 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-Month Maximum Threshold Approach in Cobb County, including all Distributors' shipments.

Table 57 Trailing Six-Month Maximum Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
Kroger	509,600	451,610	34,220	300	0	105,744	**1,101,474**
Publix	453,100	621,440	28,200	200	0	130,160	**1,233,100**
Total	**962,700**	**1,073,050**	**62,420**	**500**	**0**	**235,904**	**2,334,574**

Method 2: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold

161. Table 58 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-Month Maximum, Fixed After Triggered Threshold Approach in Cobb County, including all Distributors' shipments.

Table 58 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
Kroger	4,479,600	4,442,610	121,330	300	0	274,844	**9,318,684**
Publix	3,259,900	3,506,390	73,200	200	0	280,360	**7,120,050**
Total	**7,739,500**	**7,949,000**	**194,530**	**500**	**0**	**555,204**	**16,438,734**

Method 7: Trailing Six-month Maximum Monthly Threshold on Rolling 30-Day Dosage Units

162. Table 59 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Approach in Cobb County, including all Distributors' shipments.

Table 59 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	2,804,000	2,978,170	141,950	3,700	100	284,736	**6,212,656**
Publix	2,822,900	3,298,000	119,030	400	0	317,480	**6,557,810**
Total	**5,626,900**	**6,276,170**	**260,980**	**4,100**	**100**	**602,216**	**12,770,466**

Method 2b: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold on Rolling 30 Days Dosage Units

163. Table 60 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30 Days Dosage Units Approach in Cobb County, including all Distributors' shipments.

Table 60 Trailing Six-month Maximum, Fixed After First Triggered Threshold on Rolling 30 Days Dosage Units Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	8,547,200	11,288,200	346,750	3,700	100	440,790	**20,626,740**
Publix	7,455,220	9,910,810	257,730	400	0	550,280	**18,174,440**
Total	**16,002,420**	**21,199,010**	**604,480**	**4,100**	**100**	**991,070**	**38,801,180**

Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

164. Table 61 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments.

Table 61 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	55,700	0	12,260	3,200	4,840	50,523	**126,523**
Publix	94,700	25,400	85,100	7,224	5,460	228,285	**446,169**
Total	**150,400**	**25,400**	**97,360**	**10,424**	**10,300**	**278,808**	**572,692**

Method 3b: Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

165. Table 62 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Approach in Cobb County, including all Distributors' shipments.

Table 62 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	273,500	0	97,920	12,500	13,380	200,028	**597,328**
Publix	2,607,400	518,820	514,210	37,736	14,540	674,879	**4,367,585**
Total	**2,880,900**	**518,820**	**612,130**	**50,236**	**27,920**	**874,907**	**4,964,913**

Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

166. Table 63 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments.

Table 63 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	0	0	0	0	400	5,655	**6,055**
Publix	1,100	0	16,900	1,900	660	46,540	**67,100**
Total	**1,100**	**0**	**16,900**	**1,900**	**1,060**	**52,195**	**73,155**

Method 4b: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

167. Table 64 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Approach in Cobb County, including all Distributors' shipments.

Table 64 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	0	0	800	2,300	3,500	24,291	**30,891**
Publix	301,300	0	200,500	3,700	2,860	339,543	**847,903**
Total	**301,300**	**0**	**201,300**	**6,000**	**6,360**	**363,834**	**878,794**

Method 5: Monthly 8,000 Dosage Units

168. Table 65 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Monthly 8,000 Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments.

Table 65 Monthly 8,000 Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	457,800	1,342,460	0	0	0	0	**1,800,260**
Publix	101,300	154,030	0	0	0	0	**255,330**
Total	**559,100**	**1,496,490**	**0**	**0**	**0**	**0**	**2,055,590**

Method 6: Daily Dosage Units

169. Table 66 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Daily Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments.

Table 66 Daily Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, nonrecurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	2,736,700	7,685,940	136,360	4,600	n/a	4,600	**10,568,200**
Publix	707,200	10,629,850	52,900	1,900	n/a	1,360	**11,393,210**
Total	**3,443,900**	**18,315,790**	**189,260**	**6,500**	**n/a**	**5,960**	**21,961,410**

B. Summary of Recurrent Flagged Transactions

Method 1 (2): Trailing Six-month Maximum Monthly Threshold

170. Table 67 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-Month Maximum Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 67 Trailing Six-Month Maximum Threshold Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	9,990,320	14,324,510	613,410	700	0	1,415,562	**26,344,502**
Publix	11,474,260	14,932,710	823,330	15,400	0	1,596,390	**28,842,090**
Total	**21,464,580**	**29,257,220**	**1,436,740**	**16,100**	**0**	**3,011,952**	**55,186,592**

Method 2b (7): Trailing Six-month Maximum Monthly Threshold on Rolling 30-Day Dosage Units

171. Table 68 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Approach in Cobb County, including all Distributors' shipments. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 68 Trailing Six-month Maximum Threshold on Rolling 30-Day Dosage Units Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	10,078,520	14,573,010	837,130	52,100	6,200	1,605,576	**27,152,536**
Publix	11,825,360	15,243,010	937,100	26,500	0	1,741,820	**29,773,790**
Total	**21,903,880**	**29,816,020**	**1,774,230**	**78,600**	**6,200**	**3,347,396**	**56,926,326**

Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

172. Table 69 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 69 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	1,091,000	0	229,830	58,700	52,220	996,377	**2,428,127**
Publix	4,073,900	3,039,230	919,900	156,896	54,460	2,033,846	**10,278,232**
Total	**5,164,900**	**3,039,230**	**1,149,730**	**215,596**	**106,680**	**3,030,223**	**12,706,359**

Method 3b: Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

173. Table 70 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Approach in Cobb County, including all Distributors' shipments. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 70 Twice Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	1,349,100	0	476,580	110,800	58,820	1,366,450	**3,361,750**
Publix	5,343,700	5,327,250	1,023,870	183,996	60,700	2,323,218	**14,262,734**
Total	**6,692,800**	**5,327,250**	**1,500,450**	**294,796**	**119,520**	**3,689,668**	**17,624,484**

Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

174. Table 71 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 71 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	0	0	0	0	8,860	293,677	**302,537**
Publix	1,436,300	0	641,140	57,112	17,320	929,521	**3,081,393**
Total	**1,436,300**	**0**	**641,140**	**57,112**	**26,180**	**1,223,198**	**3,383,930**

Method 4b: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days

175. Table 72 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) plus the total shipments over the prior 29 days exceeds the threshold all subsequent orders of the same drug are flagged.

Table 72 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units, Fixed After First Triggered Threshold on Rolling 30 Days Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	0	0	40,970	29,100	38,760	409,209	**518,039**
Publix	1,609,700	0	793,670	61,812	23,440	1,269,315	**3,757,937**
Total	**1,609,700**	**0**	**834,640**	**90,912**	**62,200**	**1,678,524**	**4,275,976**

Method 5: Monthly 8,000 Dosage Units

176. Table 73 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Monthly 8,000 Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) in any month causes the cumulative shipments that month to exceed the threshold all subsequent orders of the same drug are flagged.

Table 73 Monthly 8,000 Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	2,715,200	9,026,530	0	0	0	0	**11,741,730**
Publix	1,894,800	5,386,140	0	0	0	0	**7,280,940**
Total	**4,610,000**	**14,412,670**	**0**	**0**	**0**	**0**	**19,022,670**

Method 6: Daily Dosage Units

177. Table 74 summarizes the Dosage Units of Chain Pharmacy Defendants' transactions flagged based on the Daily Dosage Units Threshold Approach in Cobb County, including all Distributors' shipments. Once an order(s) in any day exceeds the threshold all subsequent orders of the same drug are flagged.

Table 74 Daily Dosage Units Threshold Flagged Transactions, 2006 to 2019, Dosage Units, recurrent

Dosage Units of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	**Total**
Kroger	9,143,900	15,058,530	851,600	54,500	n/a	64,000	**25,172,530**
Publix	10,110,060	15,825,460	811,970	24,000	n/a	25,260	**26,796,750**
Total	**19,253,960**	**30,883,990**	**1,663,570**	**78,500**	**n/a**	**89,260**	**51,969,280**

IX. Chain Pharmacy Defendants Dispensing Data

178. I have received data from the Chain Pharmacy Defendants (Kroger and Publix) regarding their opioid dispensing activities in Cobb County. The Chain Pharmacy Defendants' Dispensing Data is composed of filled prescriptions, with each line of data containing information about prescribers, patient, drugs, dispensed/prescribed doses, and pharmacy address. I processed the Dispensing Data and appended several columns, including drug form and strength before I run any analysis (see Appendix 5).

179. In this section, I first summarize the Dispensing Data by opioid drug and by year for the Chain Pharmacy Defendants. Then I compare ARCOS Data supplemented with Defendants' Transactional Data reflecting

shipments to the Chain Pharmacy Defendants' pharmacies in Cobb County, with the Dispensing Data. I calculate the rolling 365-day total Dosage Units of the ARCOS Data and Dispensing Data.

1. Kroger

180. From December 2008 to June 2018, Kroger pharmacies in Cobb County dispensed 20.0 million Dosage Units of opioids. As shown in Table 75, oxycodone accounted for 36.2% of all Dosage Units and 41.3% of MME Kroger pharmacies dispensed in the county. Hydrocodone accounted for 54.5% of all Dosage Units and 28.9% of total MME.

Table 75 Kroger Dispensing Data in Cobb County by Opioid Drug, December 2008 to June 2018

Drug Name	# of Prescriptions	Dosage Units	Dosage Units %	MME	MME %
Oxycodone	119,011	7,229,596	36.2%	126,639,594	41.3%
Hydrocodone	263,139	10,885,332	54.5%	88,667,817	28.9%
Fentanyl	8,652	7,228	0.0%	36,764,604	12.0%
Morphine	11,680	780,432	3.9%	23,332,390	7.6%
Tapentadol	1,953	130,037	0.7%	4,412,540	1.4%
Oxymorphone	937	64,907	0.3%	4,052,955	1.3%
Hydromorphone	3,754	202,357	1.0%	3,292,024	1.1%
Methadone	5,510	670,102	3.4%	19,282,395	6.3%
Total	**414,636**	**19,969,991**	**100.0%**	**306,444,320**	**100.0%**

181. Table 76 summarizes opioid drugs dispensed by Kroger pharmacies in Cobb County by year.

Table 76 Opioid Drugs Dispensed by Kroger Pharmacies in Cobb County by Year, December 2008 to June 2018

Year	# of Prescriptions	Dosage Units	MME
2008 [1]	141	6,097	87,934
2009	31,848	1,405,558	20,545,764
2010	44,724	2,038,189	29,747,437
2011	49,109	2,256,017	33,056,444
2012	51,653	2,403,375	35,588,643
2013	51,181	2,442,170	36,142,524
2014	47,499	2,313,215	35,772,643
2015	42,108	2,161,300	35,631,367
2016	40,541	2,087,428	34,393,753
2017	39,189	2,016,065	31,945,111
2018 [1]	16,643	840,577	13,532,700
Total	**414,636**	**19,969,991**	**306,444,320**

[1] Kroger Dispensing Data goes from December 2008 to June 2018.

182. Figure 6 shows the rolling 365-day Dosage Units of fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, and tapentadol shipped into Kroger pharmacies in the ARCOS Data (from January 2007 to December 2019) and dispensed by Kroger pharmacies in the Dispensing Data (from December 2009 to June 2018).

Figure 6 Rolling 365-day Opioid Shipments into and Dispensed by Kroger Pharmacies, Dosage Units

2. Publix

183. From May 2006 to May 2019, Publix pharmacies in Cobb County dispensed 28.4 million Dosage Units of opioids. As shown in Table 77, oxycodone accounted for 37.5% of all Dosage Units and 44.4% of MME Publix pharmacies dispensed in the county. Hydrocodone accounted for 48.6% of all Dosage Units and 24.3% of total MME.

Table 77 Publix Dispensing Data in Cobb County by Opioid Drug, May 2006 to May 2019

Drug Name	# of Prescriptions	Dosage Units	Dosage Units %	MME	MME %
Oxycodone	190,089	10,673,434	37.5%	189,561,995	44.4%
Hydrocodone	384,979	13,823,102	48.6%	103,585,174	24.3%
Fentanyl	11,067	5,884	0.0%	45,507,084	10.7%
Morphine	18,140	1,137,937	4.0%	40,222,730	9.4%
Tapentadol	3,518	234,248	0.8%	8,490,100	2.0%
Codeine	42,508	1,174,118	4.1%	5,386,945	1.3%
Hydromorphone	5,841	311,903	1.1%	5,082,760	1.2%
Oxymorphone	1,279	77,039	0.3%	3,678,300	0.9%
Meperidine	5,467	136,620	0.5%	731,503	0.2%
Dihydrocodeine	196	9,119	0.0%	37,788	0.0%
Opium	16	0	0.0%	8,010	0.0%
Levorphanol	5	150	0.0%	3,300	0.0%
Methadone	6,723	859,176	3.0%	24,651,492	5.8%
Total	**669,828**	**28,442,730**	**100.0%**	**426,947,181**	**100.0%**

184. Table 78 summarizes opioid drugs dispensed by Publix pharmacies in Cobb County by year.

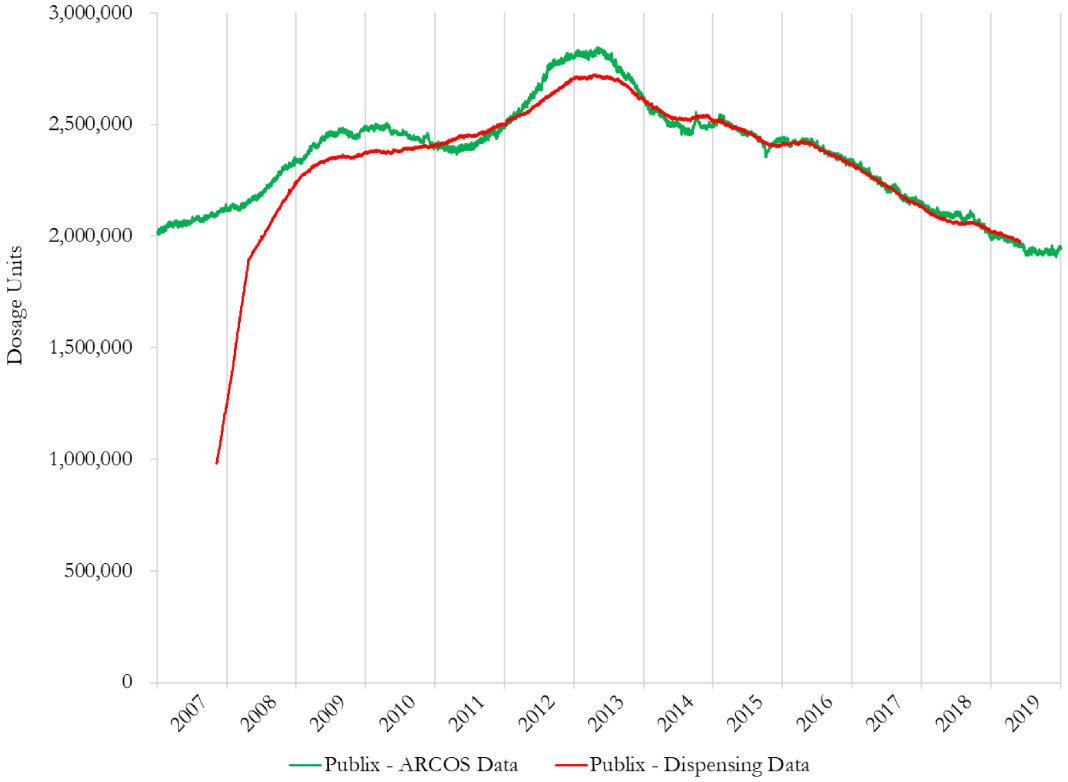
Table 78 Opioid Drugs Dispensed by Publix Pharmacies in Cobb County by Year, May 2006 to May 2019

Year	# of Prescriptions	Dosage Units	MME
2006 [1]	21	1,250	9,430
2007	29,429	1,261,630	20,122,781
2008	54,793	2,286,675	36,439,595
2009	57,510	2,396,877	36,714,861
2010	59,288	2,422,276	37,254,681
2011	62,279	2,510,203	37,274,216
2012	66,356	2,718,706	39,906,505
2013	63,350	2,621,670	37,158,280
2014	59,684	2,524,056	34,909,003
2015	54,542	2,419,903	35,162,438
2016	51,833	2,325,607	35,054,569
2017	47,302	2,134,926	32,857,901
2018	45,111	2,022,125	32,119,973
2019 [1]	18,330	796,826	11,962,948
Total	**669,828**	**28,442,730**	**426,947,181**

[1] Publix Dispensing Data goes from May 2006 to May 2019.

185. Figure 7 shows the rolling 365-day Dosage Units of codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, levorphanol, meperidine, methadone, morphine, opium, oxycodone, oxymorphone, and tapentadol shipped into Publix pharmacies in the ARCOS Data (from January 2007 to December 2019) and dispensed by Publix pharmacies in the Dispensing Data (from May 2007 to May 2019).

Figure 7 Rolling 365-day Opioid Shipments into and Dispensed by Publix Pharmacies, Dosage Units



X. Red Flag Computations on Dispensing Data

186. I have been asked by Counsel to implement various approaches to identify prescriptions meeting specified criteria using the Chain Pharmacy Defendants' Dispensing Data. The Dispensing Data was processed and ran

through 14 flag algorithms independently.[37] I included the detailed dispensing data with red flagged indicators in Appendix 12H, and additional summaries, charts, and graphs may be created using these files, consistent with any court order.

A. 14 Red Flag Computations [38]

1) An opioid was dispensed to a patient who traveled more than 25 miles to visit the pharmacy. The distance here is calculated from the center of the patient's zip code to the center of the pharmacy's zip code. [P]

2) An opioid was dispensed to a patient who traveled more than 25 miles to visit their prescriber. The distance here is calculated from the center of the patient's zip code to the center of prescriber's zip code. [P, D]

3) Patient was dispensed opioid prescriptions with overlapping days of supply that were written by two or more prescribers. [P]

4) Patient was dispensed opioid prescriptions with overlapping days of supply at two or more pharmacies. [P]

5) Patient was dispensed an opioid, a benzodiazepine, and a muscle relaxer for overlapping days of supply. [P]

[37] The de-identified patient code cannot be used to aggregate Dispensing Data across all Defendants.

[38] I report the results of the 14 algorithms two ways. First, I report only the specific dispensed prescriptions or sets of dispensed prescriptions identified by the algorithm. I also report the specific dispensed prescriptions or sets of dispensed prescriptions identified by the algorithm and any opioid prescription thereafter either dispensed to the patient denoted with a "P" or written by the prescriber denoted with a "D".

6) Patient was dispensed an opioid, a benzodiazepine, and a muscle relaxer on the same day, and all the prescriptions were written by the same prescriber. [P, D]

7) Patient was dispensed an opioid and a benzodiazepine within 30 days of one another. [P]

8) Patient was dispensed an opioid and a benzodiazepine on the same day, and both prescriptions were written by the same prescriber. [P, D]

9) Patient was dispensed two short-acting (or immediate release) opioid drugs on the same day. [P]

10) Patient was dispensed an opioid prescription of over 200 MME per day in or before 2018 or over 90 MME per day after 2018. [P, D]

11) An opioid was dispensed to at least 4 different patients on the same day, and the opioid prescriptions were for the same base drug, strength, and dosage form and were written by the same prescriber. [P, D]

12) An opioid prescription was refilled more than 5 days before the patient's previous prescription should have run out. [P]

13) A patient was dispensed more than 210 "days of supply" of all opioids combined in a 6-month period. [P]

14) A patient was dispensed an opioid and paid in cash. [P]

B. Summary of Nonrecurrent Flagged Opioid Prescriptions

187. For the prescriptions summarized below, if a prescription was flagged by one of the 14 red flag computations only that prescription was

flagged (and all subsequent prescriptions dispensed to the same patient and/or written by the same prescriber were not flagged).

3. Kroger

Table 79 Kroger Nonrecurrent Flagged Opioid Prescriptions

	No of Prescriptions
All Prescriptions	522,797
Opioid Prescriptions	414,636

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	194,566	46.9%
Red Flag Computation 1	25,293	6.1%
Red Flag Computation 2	43,165	10.4%
Red Flag Computation 3	42,315	10.2%
Red Flag Computation 4	5,857	1.4%
Red Flag Computation 5	19,133	4.6%
Red Flag Computation 6	4,785	1.2%
Red Flag Computation 7	78,373	18.9%
Red Flag Computation 8	21,378	5.2%
Red Flag Computation 9	7,412	1.8%
Red Flag Computation 10	17,124	4.1%
Red Flag Computation 11	809	0.2%
Red Flag Computation 12	1,980	0.5%
Red Flag Computation 13	70,616	17.0%
Red Flag Computation 14	30,334	7.3%

4. Publix

Table 80 Publix Nonrecurrent Flagged Opioid Prescriptions

	No of Prescriptions
All Prescriptions	1,204,308
Opioid Prescriptions	669,828

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	305,069	45.5%
Red Flag Computation 1	16,700	2.5%
Red Flag Computation 2	43,040	6.4%
Red Flag Computation 3	57,225	8.5%
Red Flag Computation 4	10,245	1.5%
Red Flag Computation 5	26,184	3.9%
Red Flag Computation 6	4,889	0.7%
Red Flag Computation 7	105,983	15.8%
Red Flag Computation 8	26,378	3.9%
Red Flag Computation 9	14,881	2.2%
Red Flag Computation 10	25,904	3.9%
Red Flag Computation 11	4,448	0.7%
Red Flag Computation 12	2,011	0.3%
Red Flag Computation 13	101,686	15.2%
Red Flag Computation 14	82,827	12.4%

C. Summary of Recurrent Flagged Opioid Prescriptions

188. For the prescriptions summarized below, if a prescription was flagged by one of the 14 red flag computations, all subsequent prescriptions dispensed to the same patient and/or written by the same prescriber are also flagged.

1. Kroger

Table 81 Kroger Recurrent Flagged Opioid Prescriptions

	No of Prescriptions
All Prescriptions	522,797
Opioid Prescriptions	414,636

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	386,250	93.2%
Red Flag Computation 1	25,521	6.2%
Red Flag Computation 2	347,097	83.7%
Red Flag Computation 3	133,686	32.2%
Red Flag Computation 4	32,815	7.9%
Red Flag Computation 5	47,454	11.4%
Red Flag Computation 6	125,173	30.2%
Red Flag Computation 7	130,929	31.6%
Red Flag Computation 8	249,450	60.2%
Red Flag Computation 9	30,657	7.4%
Red Flag Computation 10	167,229	40.3%
Red Flag Computation 11	43,886	10.6%
Red Flag Computation 12	32,343	7.8%
Red Flag Computation 13	91,470	22.1%
Red Flag Computation 14	90,032	21.7%

2. Publix

Table 82 Publix Recurrent Flagged Opioid Prescriptions

	No of Prescriptions
All Prescriptions	1,204,308
Opioid Prescriptions	669,828

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	609,268	91.0%
Red Flag Computation 1	22,673	3.4%
Red Flag Computation 2	498,368	74.4%
Red Flag Computation 3	180,514	26.9%
Red Flag Computation 4	56,550	8.4%
Red Flag Computation 5	71,565	10.7%
Red Flag Computation 6	164,498	24.6%
Red Flag Computation 7	184,014	27.5%
Red Flag Computation 8	392,963	58.7%
Red Flag Computation 9	63,040	9.4%
Red Flag Computation 10	240,674	35.9%
Red Flag Computation 11	119,712	17.9%
Red Flag Computation 12	36,261	5.4%
Red Flag Computation 13	127,416	19.0%
Red Flag Computation 14	167,140	25.0%

D. 14 Red Flag Computations, Excluding Initial Prescriptions

189. For the "combination" flags 3, 4, 5, 7 and 13, I was asked to flag *all* prescriptions in a combination that were triggered by one of the combination's prescriptions. I was also asked to modify the Red Flag

Computations by not flagging the earliest combination prescriptions and report the results in this section.[39]

1. Kroger

190. Table 83 shows the results of applying the modified methodology to the red flag results summarized in Table 79.

Table 83 Kroger Nonrecurrent Flagged Opioid Prescriptions, Excluding Initial Prescriptions in Red Flag Computations 3, 4, 5, 7 and 13

	No of Prescriptions	
All Prescriptions	522,797	
Opioid Prescriptions	414,636	
Red Flags	**Flagged Opioid Prescriptions**	**%**
Flagged for Any of the 14 Red Flag Computations	171,159	41.3%
Red Flag Computation 1	25,293	6.1%
Red Flag Computation 2	43,165	10.4%
Red Flag Computation 3	25,763	6.2%
Red Flag Computation 4	3,575	0.9%
Red Flag Computation 5	15,438	3.7%
Red Flag Computation 6	4,785	1.2%
Red Flag Computation 7	63,531	15.3%
Red Flag Computation 8	21,378	5.2%
Red Flag Computation 9	7,412	1.8%
Red Flag Computation 10	17,124	4.1%
Red Flag Computation 11	809	0.2%
Red Flag Computation 12	1,980	0.5%
Red Flag Computation 13	49,897	12.0%
Red Flag Computation 14	30,334	7.3%

[39] If the combination prescriptions were all filled on the same date, I don't treat any of them as initial prescription.

2. Publix

191. Table 84 shows the results of applying the modified methodology to the red flag results summarized in Table 80.

Table 84 Publix Nonrecurrent Flagged Opioid Prescriptions, Excluding Initial Prescriptions in Red Flag Computations 3, 4, 5, 7 and 13

	No of Prescriptions
All Prescriptions	1,204,308
Opioid Prescriptions	669,828

Red Flags	**Flagged Opioid Prescriptions**	**%**
Flagged for Any of the 14 Red Flag Computations	271,961	40.6%
Red Flag Computation 1	16,700	2.5%
Red Flag Computation 2	43,040	6.4%
Red Flag Computation 3	34,688	5.2%
Red Flag Computation 4	6,288	0.9%
Red Flag Computation 5	21,022	3.1%
Red Flag Computation 6	4,889	0.7%
Red Flag Computation 7	87,396	13.0%
Red Flag Computation 8	26,378	3.9%
Red Flag Computation 9	14,881	2.2%
Red Flag Computation 10	25,904	3.9%
Red Flag Computation 11	4,448	0.7%
Red Flag Computation 12	2,011	0.3%
Red Flag Computation 13	72,982	10.9%
Red Flag Computation 14	82,827	12.4%

E. Variants of Red Flag Computation 10 and 12

192. I have been asked by Counsel to flag those opioid prescriptions that are over 200 MME per day, oxycodone prescriptions that are over 80 mg per day, methadone prescriptions that are over 40 mg per day, and hydromorphone prescriptions that are 30 mg per day.

193. I have also been asked by Counsel to flag those opioid prescriptions that were filled more than 5 days before a previous same NDC prescription should have run out, regardless of the written quantity, when the prescriptions were written, or who wrote them.

194. The results of applying the above two algorithms are reported in Appendix 7.3I and 8.3I.

XI. Pharmacy Notes Productions

195. Kroger and Publix produced several rounds of Electronic Notes (in the form of spreadsheets, .csv, or .txt files), Scanned Prescriptions and Related Documents.

196. For each Defendant, I created a spreadsheet (hereafter "Prescription Summary") that contains the Dispensing Data for the Selected Sample Prescriptions in Cobb County. For each of the Selected Sample Prescriptions, I appended the matched Electronic Notes, Scanned Prescriptions, and Related Documents, to the extent available. I also appended the Bates numbers of matched Scanned Prescriptions and Related Documents to the row in the Sample Prescription Summary containing each of the Selected Sample Prescriptions, including a link to open the image of the Scanned Prescription and Related Documents (to the extent available). In addition, I appended the results of the red flag analysis identified in Section X. I also created a separate tab in the Prescription Summary that contains the patient prescription history for the Selected Sample Prescriptions, which includes all prescriptions filled in the Defendant's pharmacies in Cobb County

for each patient in the Selected Sample Prescriptions. I also appended the historic electronic notes to the patient prescription history tab.

1. Kroger

197. Out of the 400 Selected Sample Prescriptions that were filled by Kroger pharmacies in Cobb County, I found 260 samples that have Scanned Prescriptions and Related Documents.

198. Kroger produced data files containing Electronic Notes, Scanned Prescriptions and Related Documents on October 18, 2022. The metadata provided along with the Scanned Prescriptions and Related Documents allows me to match the Scanned Prescriptions and Related Documents with the Dispensing Data for the corresponding Selected Sample Prescriptions.

Table 85 Kroger Pharmacy Productions of Scanned Prescriptions and Related Documents

Production Number	Range of Bates Numbers	Format
Kroger-MDL060	Kroger-MDL00050503 - Kroger-MDL00051198	Hard copy
Kroger-MDL060	Kroger-MDL00051199	Electronic

2. Publix

199. Out of the 391 Selected Sample Prescriptions that were filled by Publix pharmacies in Cobb County, I found 388 samples that have Scanned Prescriptions and Related Documents.

200. Publix produced data files containing Electronic Notes, Scanned Prescriptions and Related Documents on October 19, 2022 and October 20, 2022.

Table 86 Publix Pharmacy Productions of Scanned Prescriptions and Related Documents

Production Number	Range of Bates Numbers	Format
n/a	PUBLIX-MDLT8-00145543	Electronic
PUBLIX-MDLT8_VOL028	PUBLIX-MDLT8-00135562 to 137284	Hard copy
PUBLIX-MDLT8_VOL029	PUBLIX-MDLT8-00137285 to 139116	Hard copy

XII. Discussion on Random Sampling and its Confidence Interval

201. I was asked to illustrate the correct method for calculating confidence intervals for random samples of 400 and 391 observations, which are the numbers of prescriptions in Cobb County for which Kroger and Publix produced Electronic Notes, Scanned Prescriptions and Related Documents, respectively. My calculated confidence intervals can be understood as the probable percentage of prescriptions filled by the Chain Pharmacy Defendants for which effective due diligence either was not performed or was not documented based on the Pharmacist Expert's analysis of Electronic Notes, Scanned Prescriptions and Related Documents.

202. For example, the 95% confidence interval around a point estimate of inadequate due diligence in 95% of the 400 sample flagged prescriptions that were evaluated is 92.36% to 96.78%. This implies that, at the 95% confidence level, Defendant performed and documented adequate due diligence on, at most, 3.22% to 7.64% of prescriptions filled at one of its pharmacies which tripped at least one of the red flags.

203. I assume with probability p that Defendants performed inadequate due diligence (or failed to document due diligence efforts) on each flagged prescription, and whether prescriptions receive adequate or inadequate due diligence are mutually statistically independent. Thus, the

number of prescriptions with inadequate due diligence in a sample of size n has a binomial distribution with parameters n and p. Given X prescriptions with inadequate due diligence identified from the sample, the $100(1-\alpha)\%$ confidence interval for p is given by

$$\left[\tilde{p} - z\sqrt{\frac{\tilde{p}(1-\tilde{p})}{n+z^2}}\,, \tilde{p} + z\sqrt{\frac{\tilde{p}(1-\tilde{p})}{n+z^2}}\right],$$

where $z = \Phi^{-1}\left(1-\frac{\alpha}{2}\right)$ is the quantile of a standard normal distribution (for example, a 95% confidence interval requires $\alpha = 0.05$, thus $z = 1.96$) and

$$\tilde{p} = \frac{X + \frac{z^2}{2}}{n+z^2}.$$

204. This confidence interval, proposed by Agresti & Coull (1998), is an improved version of the classical Wald confidence interval for binomial distribution with superior performance when the sample size n is small or the success probability p is close to 0 or 1.[40]

205. I calculate the confidence interval for every integer X between 0 and n under two combinations of n and α, and report the results in Appendix 9.[41] The lower bound of the confidence intervals with $n = 400$ provides a

[40] Agresti, A., & Coull, B. A. (1998). Approximate Is Better than "Exact" for Interval Estimation of Binomial Proportions. The American Statistician, 52(2), 119. https://doi.org/10.2307/2685469

[41] Appendix 9.1A shows confidence intervals for 400 observations with 95% confidence level ($\alpha = 0.05$); Appendix 9.1B shows confidence intervals for 400 observations with 99% confidence level ($\alpha = 0.01$); Appendix 9.1C shows confidence intervals for 391 observations with 95% confidence level ($\alpha = 0.05$); Appendix 9.1D shows confidence intervals for 391 observations with 99% confidence level ($\alpha = 0.01$).

lower limit on the likelihood of any Defendant performing inadequate due diligence (or failing to document due diligence) on the flagged prescriptions at the $100(1-\alpha)\%$ confidence level, assuming a constant likelihood in the given year.[42] For example, if 380 (or 95%) of the 400 prescriptions in an annual sample have inadequate due diligence based on the Pharmacist Expert's review, then at a 95% confidence level, the likelihood of inadequate due diligence (or failure to document due diligence) on flagged prescriptions is at least 92.36%. At a 99% confidence level, the lower limit on the likelihood of inadequate due diligence is 91.30%. In the absence of convincing evidence that due diligence documentation practices of the sample stores deviated significantly from the rest of the stores in the chain, it is appropriate to extrapolate the results of the Pharmacy Expert's review to all of the Defendants' prescriptions.

XIII. Conclusion

206. Based upon my comparison of the ARCOS Data produced by the DEA and the public ARCOS Retail Drug Summary Reports, I conclude that - after correcting a relatively small number of records - the ARCOS Data produced by the DEA is complete and reliable.

207. The ARCOS Data can be used to identify transactions into a state, county, zip code or individual pharmacy meeting certain criteria as I have illustrated above.

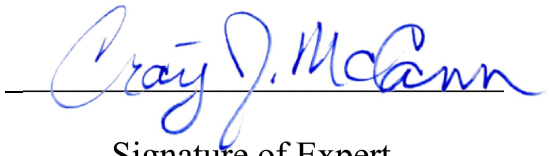
[42] This means that, were the procedure of calculating confidence interval to be repeated on numerous samples, the lower bound of calculated interval would lie below the true likelihood of inadequate due diligence for at least $100(1-\alpha)\%$ of samples.

208. I reported the market share of Distributor Defendants and Chain Pharmacy Defendants in Cobb County.

209. I reported the results of applying the non-exhaustive set of algorithms for flagging transactions to the transactions attributable to Distributor Defendants and Chain Pharmacy Defendants. I also reported the results of applying 14 red flags to the Defendant Dispensing Data.

210. All of the Opinions contained in this Expert Report are offered to a reasonable degree of probability in the fields of Economics and Statistics, which includes data processing, validation, reconciliation and summarizing of large data sets, including the ARCOS Data and related governmental data sets, Defendants' Transaction Data and Dispensing Data.

211. I continue to review documents and gather information and reserve the right to update my analysis and opinions based upon that further review of documents and based on any new information including, possibly, reports of other experts - I may receive.



Signature of Expert

8.3B Red Flag Analysis Summary on Publix Dispensing Data

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CONFIDENTIAL – SUBJECT TO PROTECTIVE ORDER

Summary of Publix Dispensing Red Flag Analysis

Cobb County, GA

Nonrecurrent

	No of Prescriptions
All Prescriptions	1,204,308
Opioid Prescriptions	669,828

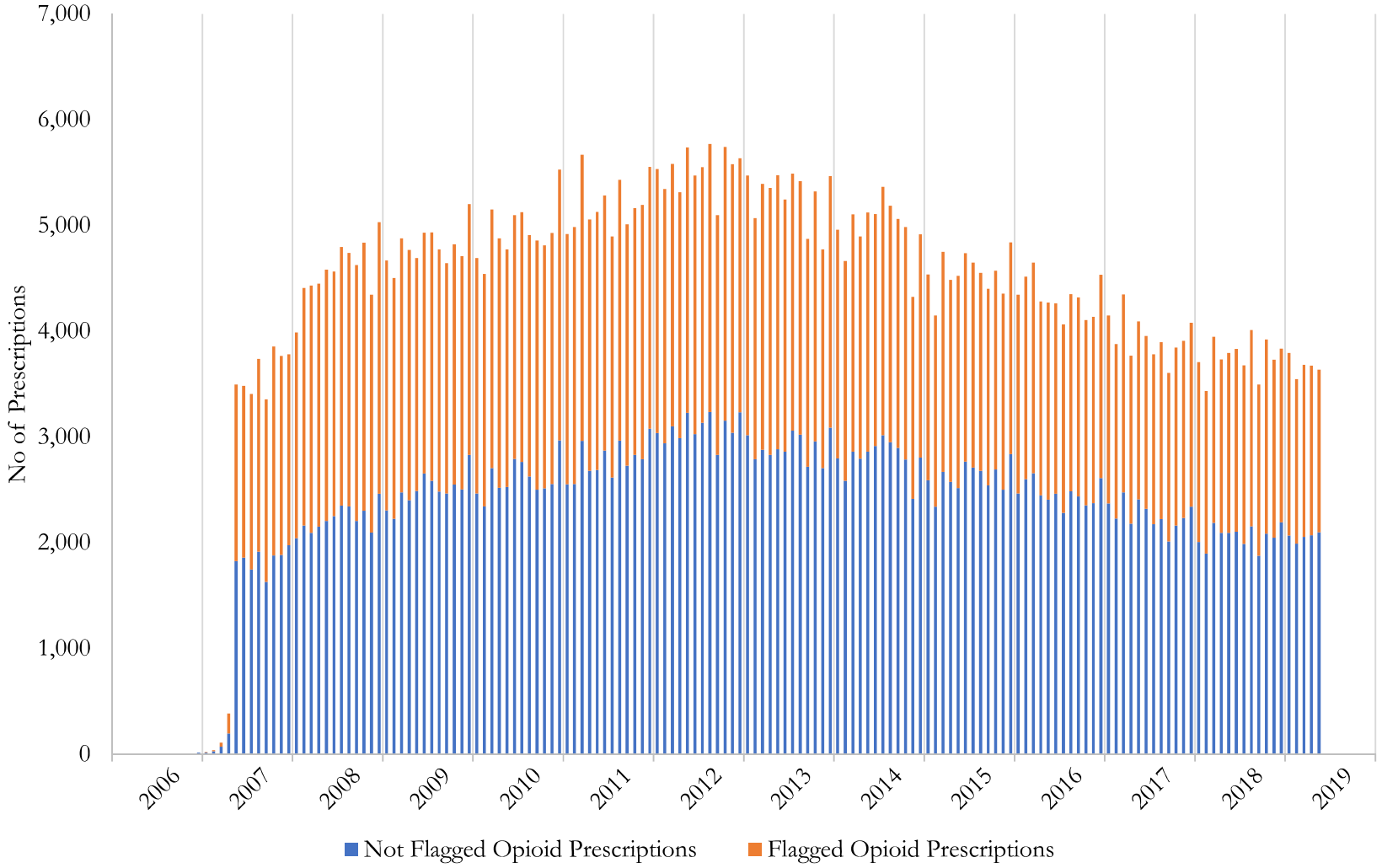
Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	305,069	45.5%
Red Flag Computation 1	16,700	2.5%
Red Flag Computation 2	43,040	6.4%
Red Flag Computation 3	57,225	8.5%
Red Flag Computation 4	10,245	1.5%
Red Flag Computation 5	26,184	3.9%
Red Flag Computation 6	4,889	0.7%
Red Flag Computation 7	105,983	15.8%
Red Flag Computation 8	26,378	3.9%
Red Flag Computation 9	14,881	2.2%
Red Flag Computation 10	25,904	3.9%
Red Flag Computation 11	4,448	0.7%
Red Flag Computation 12	2,011	0.3%
Red Flag Computation 13	101,686	15.2%
Red Flag Computation 14	82,827	12.4%

Notes:

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

Summary of Publix Dispensing Red Flag Analysis
Cobb County, GA
Nonrecurrent



Data source: Dispensing Data.
Publix: 5/2006 - 5/2019.

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Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Nonrecurrent
# of Prescriptions

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total # of Prescriptions of Rx	1,204,308	307	55,760	95,774	98,909	100,984	104,126	111,250	108,016	105,731	102,102	99,477	92,751	90,807	38,314
Total # of Prescriptions of Opioid Rx	669,828	21	29,429	54,793	57,510	59,288	62,279	66,356	63,350	59,684	54,542	51,833	47,302	45,111	18,330
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	305,069	5	14,413	28,131	27,553	28,013	28,973	29,418	28,549	26,010	23,128	22,254	20,177	20,394	8,051
	45.54%	23.81%	48.98%	51.34%	47.91%	47.25%	46.52%	44.33%	45.07%	43.58%	42.40%	42.93%	42.66%	45.21%	43.92%
Red Flag Computation 1	16,700	2	693	1,309	1,337	1,504	1,653	1,920	1,635	1,498	1,210	1,145	1,144	1,193	457
	2.49%	9.52%	2.35%	2.39%	2.32%	2.54%	2.65%	2.89%	2.58%	2.51%	2.22%	2.21%	2.42%	2.64%	2.49%
Red Flag Computation 2	43,040	1	1,901	3,698	3,577	3,209	4,110	4,300	4,149	3,983	3,265	3,143	3,223	3,212	1,269
	6.43%	4.76%	6.46%	6.75%	6.22%	5.41%	6.60%	6.48%	6.55%	6.67%	5.99%	6.06%	6.81%	7.12%	6.92%
Red Flag Computation 3	57,225	0	3,316	5,896	5,262	5,491	5,385	5,440	5,156	5,058	4,369	4,078	3,560	3,122	1,092
	8.54%	0.00%	11.27%	10.76%	9.15%	9.26%	8.65%	8.20%	8.14%	8.47%	8.01%	7.87%	7.53%	6.92%	5.96%
Red Flag Computation 4	10,245	0	457	1,179	914	537	1,104	1,111	978	947	816	724	646	563	269
	1.53%	0.00%	1.55%	2.15%	1.59%	0.91%	1.77%	1.67%	1.54%	1.59%	1.50%	1.40%	1.37%	1.25%	1.47%
Red Flag Computation 5	26,184	0	1,188	2,433	2,300	2,447	2,290	2,471	2,378	2,283	1,996	2,138	1,934	1,679	647
	3.91%	0.00%	4.04%	4.44%	4.00%	4.13%	3.68%	3.72%	3.75%	3.83%	3.66%	4.12%	4.09%	3.72%	3.53%
Red Flag Computation 6	4,889	0	245	530	531	553	554	487	449	429	325	257	234	224	71
	0.73%	0.00%	0.83%	0.97%	0.92%	0.93%	0.89%	0.73%	0.71%	0.72%	0.60%	0.50%	0.49%	0.50%	0.39%
Red Flag Computation 7	105,983	1	5,192	9,637	9,452	9,442	9,681	10,186	9,762	9,255	8,497	8,399	7,348	6,676	2,455
	15.82%	4.76%	17.64%	17.59%	16.44%	15.93%	15.54%	15.35%	15.41%	15.51%	15.58%	16.20%	15.53%	14.80%	13.39%
Red Flag Computation 8	26,378	1	1,293	2,536	2,493	2,539	2,653	2,797	2,473	2,268	2,035	1,777	1,518	1,488	507
	3.94%	4.76%	4.39%	4.63%	4.33%	4.28%	4.26%	4.22%	3.90%	3.80%	3.73%	3.43%	3.21%	3.30%	2.77%
Red Flag Computation 9	14,881	0	530	949	891	938	1,191	1,270	1,461	1,547	1,642	1,657	1,291	1,138	376
	2.22%	0.00%	1.80%	1.73%	1.55%	1.58%	1.91%	1.91%	2.31%	2.59%	3.01%	3.20%	2.73%	2.52%	2.05%
Red Flag Computation 10	25,904	0	1,177	2,203	2,246	2,299	2,294	2,399	2,263	1,881	1,954	1,982	1,862	1,540	1,804
	3.87%	0.00%	4.00%	4.02%	3.91%	3.88%	3.68%	3.62%	3.57%	3.15%	3.58%	3.82%	3.94%	3.41%	9.84%
Red Flag Computation 11	4,448	0	52	325	434	595	777	797	430	246	174	216	144	195	63
	0.66%	0.00%	0.18%	0.59%	0.75%	1.00%	1.25%	1.20%	0.68%	0.41%	0.32%	0.42%	0.30%	0.43%	0.34%
Red Flag Computation 12	2,011	0	184	302	290	293	222	255	182	111	59	39	31	31	12
	0.30%	0.00%	0.63%	0.55%	0.50%	0.49%	0.36%	0.38%	0.29%	0.19%	0.11%	0.08%	0.07%	0.07%	0.07%
Red Flag Computation 13	101,686	0	4,824	9,369	8,196	8,614	8,652	9,139	8,919	8,363	8,290	8,485	8,011	8,111	2,713
	15.18%	0.00%	16.39%	17.10%	14.25%	14.53%	13.89%	13.77%	14.08%	14.01%	15.20%	16.37%	16.94%	17.98%	14.80%
Red Flag Computation 14	82,827	1	4,308	9,735	9,479	9,264	9,255	8,264	7,951	6,027	4,439	3,993	3,516	4,750	1,845
	12.37%	4.76%	14.64%	17.77%	16.48%	15.63%	14.86%	12.45%	12.55%	10.10%	8.14%	7.70%	7.43%	10.53%	10.07%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 134 of 155. PageID #: 636998

Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Nonrecurrent
Dosage Units

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Dosage Units of Rx	53,444,607	16,825	2,507,121	4,234,130	4,381,084	4,426,376	4,510,604	4,845,506	4,716,979	4,665,369	4,608,611	4,519,670	4,214,356	4,106,879	1,691,097
Total Dosage Units of Opioid Rx	28,442,730	1,250	1,261,630	2,286,675	2,396,877	2,422,276	2,510,203	2,718,706	2,621,670	2,524,056	2,419,903	2,325,607	2,134,926	2,022,125	796,826
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	15,829,806	310	749,780	1,395,510	1,377,604	1,381,273	1,411,248	1,490,543	1,428,460	1,350,746	1,287,534	1,253,910	1,131,115	1,135,860	435,913
	55.66%	24.80%	59.43%	61.03%	57.47%	57.02%	56.22%	54.83%	54.49%	53.51%	53.21%	53.92%	52.98%	56.17%	54.71%
Red Flag Computation 1	692,593	120	35,556	61,763	54,061	59,644	73,204	81,831	67,419	55,002	46,474	44,976	47,205	49,543	15,795
	2.44%	9.60%	2.82%	2.70%	2.26%	2.46%	2.92%	3.01%	2.57%	2.18%	1.92%	1.93%	2.21%	2.45%	1.98%
Red Flag Computation 2	2,135,996	100	99,311	180,363	155,626	135,876	198,001	208,244	200,035	197,705	179,547	163,201	175,570	177,723	64,694
	7.51%	8.00%	7.87%	7.89%	6.49%	5.61%	7.89%	7.66%	7.63%	7.83%	7.42%	7.02%	8.22%	8.79%	8.12%
Red Flag Computation 3	3,426,078	0	191,453	337,141	304,934	315,894	316,723	327,449	309,561	298,428	274,891	258,107	216,360	205,588	69,549
	12.05%	0.00%	15.18%	14.74%	12.72%	13.04%	12.62%	12.04%	11.81%	11.82%	11.36%	11.10%	10.13%	10.17%	8.73%
Red Flag Computation 4	667,925	0	25,171	64,629	59,191	33,023	68,555	77,358	65,915	60,255	56,469	53,573	45,662	39,863	18,261
	2.35%	0.00%	2.00%	2.83%	2.47%	1.36%	2.73%	2.85%	2.51%	2.39%	2.33%	2.30%	2.14%	1.97%	2.29%
Red Flag Computation 5	1,989,771	0	89,032	191,590	182,715	177,767	167,603	188,651	181,461	171,164	159,378	161,031	148,693	123,958	46,728
	7.00%	0.00%	7.06%	8.38%	7.62%	7.34%	6.68%	6.94%	6.92%	6.78%	6.59%	6.92%	6.96%	6.13%	5.86%
Red Flag Computation 6	406,300	0	22,620	52,448	48,237	43,784	43,777	40,238	37,437	34,889	24,245	18,319	18,216	16,678	5,412
	1.43%	0.00%	1.79%	2.29%	2.01%	1.81%	1.74%	1.48%	1.43%	1.38%	1.00%	0.79%	0.85%	0.82%	0.68%
Red Flag Computation 7	6,385,705	30	296,435	562,956	560,475	559,600	572,853	625,556	582,822	558,590	535,452	518,080	451,014	411,565	150,277
	22.45%	2.40%	23.50%	24.62%	23.38%	23.10%	22.82%	23.01%	22.23%	22.13%	22.13%	22.28%	21.13%	20.35%	18.86%
Red Flag Computation 8	1,743,382	30	83,917	175,607	168,109	164,239	179,505	188,919	165,436	154,417	137,385	116,611	92,154	87,819	29,234
	6.13%	2.40%	6.65%	7.68%	7.01%	6.78%	7.15%	6.95%	6.31%	6.12%	5.68%	5.01%	4.32%	4.34%	3.67%
Red Flag Computation 9	842,818	0	25,085	50,594	54,276	58,403	73,298	78,377	79,637	72,484	85,025	96,925	76,277	70,412	22,025
	2.96%	0.00%	1.99%	2.21%	2.26%	2.41%	2.92%	2.88%	3.04%	2.87%	3.51%	4.17%	3.57%	3.48%	2.76%
Red Flag Computation 10	2,218,048	0	99,957	199,234	205,276	211,217	205,867	208,147	179,001	155,506	173,670	177,595	150,582	118,501	133,495
	7.80%	0.00%	7.92%	8.71%	8.56%	8.72%	8.20%	7.66%	6.83%	6.16%	7.18%	7.64%	7.05%	5.86%	16.75%
Red Flag Computation 11	121,034	0	2,017	9,141	11,097	14,389	17,343	21,044	12,449	5,899	3,978	8,436	5,056	7,315	2,870
	0.43%	0.00%	0.16%	0.40%	0.46%	0.59%	0.69%	0.77%	0.47%	0.23%	0.16%	0.36%	0.24%	0.36%	0.36%
Red Flag Computation 12	145,087	0	13,193	24,311	22,278	21,812	15,154	17,814	12,398	7,681	3,477	2,784	2,091	1,521	573
	0.51%	0.00%	1.05%	1.06%	0.93%	0.90%	0.60%	0.66%	0.47%	0.30%	0.14%	0.12%	0.10%	0.08%	0.07%
Red Flag Computation 13	7,740,347	0	354,348	701,352	628,660	661,666	664,956	701,317	662,160	631,617	657,571	668,923	599,424	607,568	200,785
	27.21%	0.00%	28.09%	30.67%	26.23%	27.32%	26.49%	25.80%	25.26%	25.02%	27.17%	28.76%	28.08%	30.05%	25.20%
Red Flag Computation 14	2,319,647	60	164,787	322,076	301,727	264,660	247,769	225,043	205,148	141,780	98,045	89,446	86,629	126,972	45,505
	8.16%	4.80%	13.06%	14.08%	12.59%	10.93%	9.87%	8.28%	7.83%	5.62%	4.05%	3.85%	4.06%	6.28%	5.71%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

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Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Nonrecurrent
MME

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total MME of Rx	426,947,181	9,430	20,122,781	36,439,595	36,714,861	37,254,681	37,274,216	39,906,505	37,158,280	34,909,003	35,162,438	35,054,569	32,857,901	32,119,973	11,962,948
Total MME of Opioid Rx	426,947,181	9,430	20,122,781	36,439,595	36,714,861	37,254,681	37,274,216	39,906,505	37,158,280	34,909,003	35,162,438	35,054,569	32,857,901	32,119,973	11,962,948
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	308,456,591	2,340	15,277,958	28,147,214	27,146,795	27,521,772	27,296,976	28,845,855	26,218,235	24,232,961	24,824,542	24,873,758	22,819,099	22,788,970	8,460,114
	72.25%	24.81%	75.92%	77.24%	73.94%	73.87%	73.23%	72.28%	70.56%	69.42%	70.60%	70.96%	69.45%	70.95%	70.72%
Red Flag Computation 1	11,655,179	1,200	825,524	1,076,805	816,111	1,034,862	1,496,495	1,422,577	1,041,952	755,306	684,808	622,070	736,555	902,477	238,438
	2.73%	12.73%	4.10%	2.96%	2.22%	2.78%	4.01%	3.56%	2.80%	2.16%	1.95%	1.77%	2.24%	2.81%	1.99%
Red Flag Computation 2	38,638,175	450	1,691,419	3,381,345	2,668,147	2,273,736	3,536,180	3,858,820	3,522,259	3,497,580	3,494,262	2,960,095	3,187,413	3,427,225	1,139,245
	9.05%	4.77%	8.41%	9.28%	7.27%	6.10%	9.49%	9.67%	9.48%	10.02%	9.94%	8.44%	9.70%	10.67%	9.52%
Red Flag Computation 3	70,335,396	0	4,726,780	7,805,845	6,580,442	6,573,863	6,471,412	6,651,402	6,079,464	5,489,974	5,218,205	5,131,378	4,428,418	4,056,657	1,121,556
	16.47%	0.00%	23.49%	21.42%	17.92%	17.65%	17.36%	16.67%	16.36%	15.73%	14.84%	14.64%	13.48%	12.63%	9.38%
Red Flag Computation 4	15,459,315	0	621,404	1,320,112	1,094,638	649,557	1,917,422	1,945,514	1,551,000	1,351,016	1,360,852	1,268,997	1,073,007	897,178	408,620
	3.62%	0.00%	3.09%	3.62%	2.98%	1.74%	5.14%	4.88%	4.17%	3.87%	3.87%	3.62%	3.27%	2.79%	3.42%
Red Flag Computation 5	41,649,206	0	1,675,381	3,939,353	3,800,438	4,114,141	4,070,749	4,423,682	4,002,811	3,337,032	3,187,754	3,167,242	2,849,753	2,276,276	804,598
	9.76%	0.00%	8.33%	10.81%	10.35%	11.04%	10.92%	11.09%	10.77%	9.56%	9.07%	9.04%	8.67%	7.09%	6.73%
Red Flag Computation 6	9,230,218	0	469,376	1,140,012	1,126,841	1,196,676	1,177,229	943,181	884,743	681,545	469,725	356,728	396,766	298,733	88,666
	2.16%	0.00%	2.33%	3.13%	3.07%	3.21%	3.16%	2.36%	2.38%	1.95%	1.34%	1.02%	1.21%	0.93%	0.74%
Red Flag Computation 7	120,422,869	150	5,555,586	10,855,966	11,055,971	11,360,580	11,600,464	12,891,569	10,973,068	9,556,430	9,522,823	9,311,420	8,145,355	7,078,113	2,515,377
	28.21%	1.59%	27.61%	29.79%	30.11%	30.49%	31.12%	32.30%	29.53%	27.38%	27.08%	26.56%	24.79%	22.04%	21.03%
Red Flag Computation 8	35,150,381	150	1,703,376	3,602,756	3,653,086	3,716,067	4,203,685	3,794,917	3,188,240	2,747,742	2,376,153	2,051,612	1,841,327	1,701,606	569,665
	8.23%	1.59%	8.46%	9.89%	9.95%	9.97%	11.28%	9.51%	8.58%	7.87%	6.76%	5.85%	5.60%	5.30%	4.76%
Red Flag Computation 9	15,894,142	0	304,033	804,513	1,009,799	1,110,328	1,482,973	1,608,729	1,430,897	1,018,786	1,330,399	1,965,933	1,654,113	1,681,756	491,884
	3.72%	0.00%	1.51%	2.21%	2.75%	2.98%	3.98%	4.03%	3.85%	2.92%	3.78%	5.61%	5.03%	5.24%	4.11%
Red Flag Computation 10	106,714,822	0	5,755,639	10,741,341	10,546,824	10,880,213	10,435,400	10,241,466	8,227,177	7,011,792	7,706,173	7,859,373	6,914,490	5,703,281	4,691,654
	24.99%	0.00%	28.60%	29.48%	28.73%	29.20%	28.00%	25.66%	22.14%	20.09%	21.92%	22.42%	21.04%	17.76%	39.22%
Red Flag Computation 11	1,034,981	0	15,035	66,880	61,612	82,530	100,297	208,312	127,838	47,608	23,687	125,165	55,976	87,663	32,380
	0.24%	0.00%	0.07%	0.18%	0.17%	0.22%	0.27%	0.52%	0.34%	0.14%	0.07%	0.36%	0.17%	0.27%	0.27%
Red Flag Computation 12	1,847,100	0	122,985	272,222	232,211	236,880	205,092	270,093	148,114	102,330	120,636	56,908	43,548	27,874	8,208
	0.43%	0.00%	0.61%	0.75%	0.63%	0.64%	0.55%	0.68%	0.40%	0.29%	0.34%	0.16%	0.13%	0.09%	0.07%
Red Flag Computation 13	206,006,837	0	9,973,986	19,206,887	17,435,679	18,219,662	17,891,085	18,892,013	16,582,477	15,618,848	17,043,857	17,843,883	16,266,976	16,017,156	5,014,329
	48.25%	0.00%	49.57%	52.71%	47.49%	48.91%	48.00%	47.34%	44.63%	44.74%	48.47%	50.90%	49.51%	49.87%	41.92%
Red Flag Computation 14	27,587,309	540	2,249,374	4,471,380	3,800,587	3,021,892	2,911,702	2,526,149	2,093,493	1,295,588	911,988	918,922	1,090,630	1,709,198	585,868
	6.46%	5.73%	11.18%	12.27%	10.35%	8.11%	7.81%	6.33%	5.63%	3.71%	2.59%	2.62%	3.32%	5.32%	4.90%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 136 of 155. PageID #: 637000

CONFIDENTIAL - SUBJECT TO PROTECTIVE ORDER

Summary of Opioid Prescriptions - Flagged Multiple Times
Cobb County, GA
Nonrecurrent

Defendant	Publix	
Total # of Opioid Prescriptions	**669,828**	
Opioid Prescriptions Flagged - 2+ Methods	131,055	19.57%
Opioid Prescriptions Flagged - 3+ Methods	53,306	7.96%
Opioid Prescriptions Flagged - 4+ Methods	21,255	3.17%
Opioid Prescriptions Flagged - 5+ Methods	7,936	1.18%
Opioid Prescriptions Flagged - 6+ Methods	2,802	0.42%
Opioid Prescriptions Flagged - 7+ Methods	761	0.11%
Opioid Prescriptions Flagged - 8+ Methods	166	0.02%
Opioid Prescriptions Flagged - 9+ Methods	41	0.01%
Opioid Prescriptions Flagged - 10+ Methods	10	0.00%
Opioid Prescriptions Flagged - 11+ Methods	0	0.00%

Notes

[1] Defendant	Date Range
Publix	5/2006 - 5/2019

CONFIDENTIAL – SUBJECT TO PROTECTIVE ORDER

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA

Publix

Nonrecurrent

	No of Prescriptions
All Prescriptions	1,368,643
Opioid Prescriptions	752,246

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	337,882	44.9%
Red Flag Computation 1	5,738	0.8%
Red Flag Computation 2	38,049	5.1%
Red Flag Computation 3	65,626	8.7%
Red Flag Computation 4	15,832	2.1%
Red Flag Computation 5	30,091	4.0%
Red Flag Computation 6	5,195	0.7%
Red Flag Computation 7	122,851	16.3%
Red Flag Computation 8	29,133	3.9%
Red Flag Computation 9	16,563	2.2%
Red Flag Computation 10	27,466	3.7%
Red Flag Computation 11	8,141	1.1%
Red Flag Computation 12	2,152	0.3%
Red Flag Computation 13	114,121	15.2%
Red Flag Computation 14	89,875	11.9%

Notes:

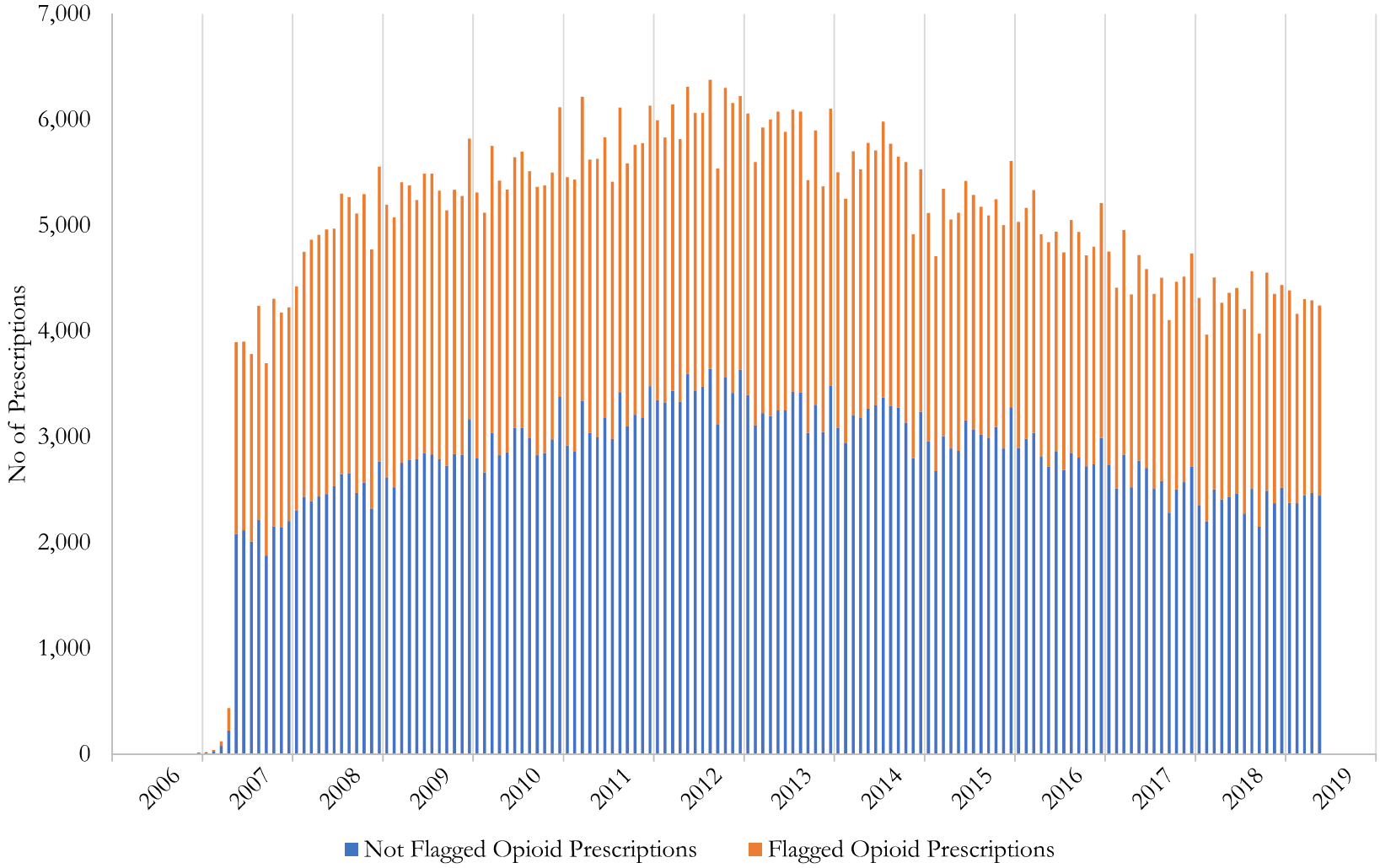
[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA

Publix

Nonrecurrent



Data source: Dispensing Data.
Publix: 6/2006 - 5/2019.

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Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year

Publix

Nonrecurrent

# of Prescriptions

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total # of Prescriptions of Rx	1,368,643	340	61,978	105,076	110,513	113,411	116,105	123,717	121,694	119,957	118,282	116,481	108,910	106,753	45,426
Total # of Prescriptions of Opioid Rx	752,246	20	32,838	60,184	64,179	66,157	68,976	72,822	70,516	66,929	62,183	59,688	54,455	51,912	21,387
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	337,882	3	15,681	30,186	30,677	30,776	31,261	31,503	31,371	28,828	26,286	25,592	23,206	23,237	9,275
	44.92%	15.00%	47.75%	50.16%	47.80%	46.52%	45.32%	43.26%	44.49%	43.07%	42.27%	42.88%	42.62%	44.76%	43.37%
Red Flag Computation 1	5,738	0	215	351	369	532	516	573	564	537	513	430	439	524	175
	0.76%	0.00%	0.65%	0.58%	0.57%	0.80%	0.75%	0.79%	0.80%	0.80%	0.82%	0.72%	0.81%	1.01%	0.82%
Red Flag Computation 2	38,049	1	1,666	3,306	3,052	2,388	3,420	3,416	3,625	3,610	3,092	3,100	3,115	3,091	1,167
	5.06%	5.00%	5.07%	5.49%	4.76%	3.61%	4.96%	4.69%	5.14%	5.39%	4.97%	5.19%	5.72%	5.95%	5.46%
Red Flag Computation 3	65,626	0	3,623	6,630	6,502	6,611	5,961	6,032	5,817	5,661	4,921	4,752	4,182	3,639	1,295
	8.72%	0.00%	11.03%	11.02%	10.13%	9.99%	8.64%	8.28%	8.25%	8.46%	7.91%	7.96%	7.68%	7.01%	6.06%
Red Flag Computation 4	15,832	0	633	1,614	1,918	1,334	1,451	1,543	1,382	1,332	1,208	1,099	988	934	396
	2.10%	0.00%	1.93%	2.68%	2.99%	2.02%	2.10%	2.12%	1.96%	1.99%	1.94%	1.84%	1.81%	1.80%	1.85%
Red Flag Computation 5	30,091	0	1,430	2,644	2,705	2,917	2,513	2,789	2,654	2,534	2,362	2,491	2,297	1,970	785
	4.00%	0.00%	4.35%	4.39%	4.21%	4.41%	3.64%	3.83%	3.76%	3.79%	3.80%	4.17%	4.22%	3.79%	3.67%
Red Flag Computation 6	5,195	0	346	553	561	641	553	504	474	419	336	281	243	213	71
	0.69%	0.00%	1.05%	0.92%	0.87%	0.97%	0.80%	0.69%	0.67%	0.63%	0.54%	0.47%	0.45%	0.41%	0.33%
Red Flag Computation 7	122,851	1	5,995	10,656	11,420	11,408	10,866	11,252	10,875	10,559	10,180	9,959	8,769	7,873	3,038
	16.33%	5.00%	18.26%	17.71%	17.79%	17.24%	15.75%	15.45%	15.42%	15.78%	16.37%	16.69%	16.10%	15.17%	14.20%
Red Flag Computation 8	29,133	1	1,521	2,711	2,742	2,926	2,809	2,892	2,624	2,434	2,364	2,120	1,721	1,662	606
	3.87%	5.00%	4.63%	4.50%	4.27%	4.42%	4.07%	3.97%	3.72%	3.64%	3.80%	3.55%	3.16%	3.20%	2.83%
Red Flag Computation 9	16,563	0	661	1,057	1,038	1,065	1,325	1,322	1,501	1,636	1,928	1,830	1,472	1,274	454
	2.20%	0.00%	2.01%	1.76%	1.62%	1.61%	1.92%	1.82%	2.13%	2.44%	3.10%	3.07%	2.70%	2.45%	2.12%
Red Flag Computation 10	27,466	0	1,336	2,480	2,461	2,419	2,310	2,425	2,339	1,974	2,019	2,041	2,000	1,655	2,007
	3.65%	0.00%	4.07%	4.12%	3.83%	3.66%	3.35%	3.33%	3.32%	2.95%	3.25%	3.42%	3.67%	3.19%	9.38%
Red Flag Computation 11	8,141	0	80	535	586	840	1,120	1,162	800	553	540	620	504	550	251
	1.08%	0.00%	0.24%	0.89%	0.91%	1.27%	1.62%	1.60%	1.13%	0.83%	0.87%	1.04%	0.93%	1.06%	1.17%
Red Flag Computation 12	2,152	0	187	325	313	324	241	252	207	118	65	39	33	37	11
	0.29%	0.00%	0.57%	0.54%	0.49%	0.49%	0.35%	0.35%	0.29%	0.18%	0.10%	0.07%	0.06%	0.07%	0.05%
Red Flag Computation 13	114,121	0	5,378	10,577	9,284	9,688	9,369	9,928	9,827	9,330	9,399	9,720	9,277	9,182	3,162
	15.17%	0.00%	16.38%	17.57%	14.47%	14.64%	13.58%	13.63%	13.94%	13.94%	15.12%	16.28%	17.04%	17.69%	14.78%
Red Flag Computation 14	89,875	1	4,590	10,185	10,130	9,697	9,715	8,849	8,797	6,671	4,922	4,530	4,082	5,527	2,179
	11.95%	5.00%	13.98%	16.92%	15.78%	14.66%	14.08%	12.15%	12.48%	9.97%	7.92%	7.59%	7.50%	10.65%	10.19%

Notes

[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 140 of 155. PageID #: 637004

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year

Publix

Nonrecurrent

Dosage Units

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Dosage Units of Rx	60,391,886	18,955	2,768,882	4,627,876	4,873,777	4,951,025	4,985,260	5,338,257	5,275,136	5,265,554	5,310,478	5,251,706	4,916,788	4,795,773	2,012,419
Total Dosage Units of Opioid Rx	31,789,759	1,130	1,405,959	2,514,460	2,669,391	2,705,871	2,754,670	2,952,836	2,896,990	2,807,332	2,746,759	2,660,896	2,436,064	2,303,416	933,985
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	17,538,252	160	817,318	1,512,621	1,541,329	1,531,806	1,514,572	1,584,061	1,561,022	1,494,193	1,461,635	1,439,577	1,294,220	1,280,379	505,359
	55.17%	14.16%	58.13%	60.16%	57.74%	56.61%	54.98%	53.65%	53.88%	53.22%	53.21%	54.10%	53.13%	55.59%	54.11%
Red Flag Computation 1	214,478	0	10,538	14,398	15,882	22,259	16,632	19,793	19,511	19,562	19,669	14,336	13,559	21,447	6,892
	0.67%	0.00%	0.75%	0.57%	0.59%	0.82%	0.60%	0.67%	0.67%	0.70%	0.72%	0.54%	0.56%	0.93%	0.74%
Red Flag Computation 2	1,980,418	100	86,299	163,630	136,839	106,229	159,922	171,728	178,773	195,009	185,633	176,973	176,403	178,290	64,590
	6.23%	8.85%	6.14%	6.51%	5.13%	3.93%	5.81%	5.82%	6.17%	6.95%	6.76%	6.65%	7.24%	7.74%	6.92%
Red Flag Computation 3	3,846,615	0	208,453	371,558	365,024	372,155	342,649	353,309	342,417	325,425	303,650	296,747	251,581	232,729	80,918
	12.10%	0.00%	14.83%	14.78%	13.67%	13.75%	12.44%	11.97%	11.82%	11.59%	11.05%	11.15%	10.33%	10.10%	8.66%
Red Flag Computation 4	1,000,922	0	35,520	88,657	113,797	76,214	88,673	106,293	87,889	84,701	83,048	78,641	67,706	62,621	27,162
	3.15%	0.00%	2.53%	3.53%	4.26%	2.82%	3.22%	3.60%	3.03%	3.02%	3.02%	2.96%	2.78%	2.72%	2.91%
Red Flag Computation 5	2,260,589	0	103,857	205,854	210,913	209,940	183,520	207,961	199,048	190,573	188,870	184,917	173,538	145,030	56,568
	7.11%	0.00%	7.39%	8.19%	7.90%	7.76%	6.66%	7.04%	6.87%	6.79%	6.88%	6.95%	7.12%	6.30%	6.06%
Red Flag Computation 6	426,576	0	28,381	53,734	50,746	51,514	44,318	40,761	38,583	35,393	26,321	19,519	18,271	14,414	4,621
	1.34%	0.00%	2.02%	2.14%	1.90%	1.90%	1.61%	1.38%	1.33%	1.26%	0.96%	0.73%	0.75%	0.63%	0.49%
Red Flag Computation 7	7,309,108	30	342,734	625,085	665,354	669,662	633,625	672,142	633,410	631,060	632,399	607,989	533,683	480,002	181,933
	22.99%	2.65%	24.38%	24.86%	24.93%	24.75%	23.00%	22.76%	21.86%	22.48%	23.02%	22.85%	21.91%	20.84%	19.48%
Red Flag Computation 8	1,901,682	30	98,726	189,062	188,582	193,010	186,314	188,065	169,252	163,059	157,301	135,309	103,543	95,358	34,071
	5.98%	2.65%	7.02%	7.52%	7.06%	7.13%	6.76%	6.37%	5.84%	5.81%	5.73%	5.09%	4.25%	4.14%	3.65%
Red Flag Computation 9	925,212	0	31,855	55,257	62,057	64,113	77,459	79,323	80,735	76,520	96,418	104,450	87,108	80,404	29,513
	2.91%	0.00%	2.27%	2.20%	2.32%	2.37%	2.81%	2.69%	2.79%	2.73%	3.51%	3.93%	3.58%	3.49%	3.16%
Red Flag Computation 10	2,357,235	0	113,692	219,652	237,172	232,712	208,521	209,559	187,079	162,463	180,349	177,798	154,121	124,155	149,962
	7.42%	0.00%	8.09%	8.74%	8.88%	8.60%	7.57%	7.10%	6.46%	5.79%	6.57%	6.68%	6.33%	5.39%	16.06%
Red Flag Computation 11	278,144	0	3,064	19,039	16,981	21,359	26,071	32,861	28,005	19,193	16,975	29,484	25,241	27,960	11,911
	0.87%	0.00%	0.22%	0.76%	0.64%	0.79%	0.95%	1.11%	0.97%	0.68%	0.62%	1.11%	1.04%	1.21%	1.28%
Red Flag Computation 12	154,520	0	13,432	26,108	23,935	23,310	16,013	17,231	14,358	8,637	4,011	2,727	2,201	1,964	593
	0.49%	0.00%	0.96%	1.04%	0.90%	0.86%	0.58%	0.58%	0.50%	0.31%	0.15%	0.10%	0.09%	0.09%	0.06%
Red Flag Computation 13	8,641,740	0	395,816	791,436	713,843	747,078	718,672	757,463	722,116	695,439	741,485	757,119	686,608	680,662	234,003
	27.18%	0.00%	28.15%	31.48%	26.74%	27.61%	26.09%	25.65%	24.93%	24.77%	26.99%	28.45%	28.19%	29.55%	25.05%
Red Flag Computation 14	2,462,549	30	173,203	334,053	312,012	266,610	249,868	228,395	222,838	157,195	109,728	101,393	102,247	149,637	55,340
	7.75%	2.65%	12.32%	13.29%	11.69%	9.85%	9.07%	7.73%	7.69%	5.60%	3.99%	3.81%	4.20%	6.50%	5.93%

Notes

[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 141 of 155. PageID #: 637005

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year

Publix

Nonrecurrent

MME

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total MME of Rx	469,961,290	8,050	22,204,552	39,925,055	40,751,931	41,132,826	39,999,522	42,624,727	40,524,167	38,320,788	38,970,038	39,260,335	37,026,140	35,500,690	13,712,469
Total MME of Opioid Rx	469,961,290	8,050	22,204,552	39,925,055	40,751,931	41,132,826	39,999,522	42,624,727	40,524,167	38,320,788	38,970,038	39,260,335	37,026,140	35,500,690	13,712,469
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	337,439,392	735	16,726,989	30,736,760	30,303,673	30,186,011	28,770,791	30,278,256	28,329,535	26,578,028	27,288,187	27,802,993	25,853,762	25,023,533	9,560,140
	71.80%	9.13%	75.33%	76.99%	74.36%	73.39%	71.93%	71.03%	69.91%	69.36%	70.02%	70.82%	69.83%	70.49%	69.72%
Red Flag Computation 1	3,120,208	0	159,403	206,924	241,405	365,297	236,443	252,325	289,114	254,661	281,854	194,720	196,866	333,278	107,919
	0.66%	0.00%	0.72%	0.52%	0.59%	0.89%	0.59%	0.59%	0.71%	0.66%	0.72%	0.50%	0.53%	0.94%	0.79%
Red Flag Computation 2	35,261,555	450	1,341,475	3,219,454	2,454,830	1,740,231	2,525,066	2,920,598	2,941,864	3,425,716	3,587,343	3,288,017	3,298,816	3,394,453	1,123,243
	7.50%	5.59%	6.04%	8.06%	6.02%	4.23%	6.31%	6.85%	7.26%	8.94%	9.21%	8.37%	8.91%	9.56%	8.19%
Red Flag Computation 3	78,369,491	0	5,118,385	8,621,520	7,840,698	7,732,727	7,056,093	7,150,656	6,608,714	5,954,409	5,591,328	5,812,823	5,086,949	4,475,409	1,319,780
	16.68%	0.00%	23.05%	21.59%	19.24%	18.80%	17.64%	16.78%	16.31%	15.54%	14.35%	14.81%	13.74%	12.61%	9.62%
Red Flag Computation 4	21,720,501	0	751,213	1,787,241	2,210,198	1,534,300	2,308,394	2,484,699	1,946,911	1,715,089	1,801,722	1,688,822	1,519,150	1,400,402	572,362
	4.62%	0.00%	3.38%	4.48%	5.42%	3.73%	5.77%	5.83%	4.80%	4.48%	4.62%	4.30%	4.10%	3.94%	4.17%
Red Flag Computation 5	45,951,955	0	1,929,375	4,180,856	4,242,780	4,607,299	4,393,491	4,849,121	4,280,707	3,591,519	3,558,186	3,466,864	3,329,543	2,579,790	942,425
	9.78%	0.00%	8.69%	10.47%	10.41%	11.20%	10.98%	11.38%	10.56%	9.37%	9.13%	8.83%	8.99%	7.27%	6.87%
Red Flag Computation 6	9,084,245	0	548,103	1,056,117	1,023,459	1,223,109	1,102,542	928,389	863,412	669,421	508,005	381,853	428,258	271,190	80,390
	1.93%	0.00%	2.47%	2.65%	2.51%	2.97%	2.76%	2.18%	2.13%	1.75%	1.30%	0.97%	1.16%	0.76%	0.59%
Red Flag Computation 7	135,123,911	150	6,568,188	12,017,679	12,839,389	13,205,584	12,485,510	13,493,999	11,520,633	10,616,875	11,089,526	10,620,450	9,486,393	8,116,276	3,063,259
	28.75%	1.86%	29.58%	30.10%	31.51%	32.10%	31.21%	31.66%	28.43%	27.71%	28.46%	27.05%	25.62%	22.86%	22.34%
Red Flag Computation 8	36,913,437	150	1,990,668	3,781,104	3,958,277	4,141,316	4,088,196	3,568,626	3,060,736	2,797,823	2,742,345	2,356,680	1,976,847	1,781,853	668,816
	7.85%	1.86%	8.97%	9.47%	9.71%	10.07%	10.22%	8.37%	7.55%	7.30%	7.04%	6.00%	5.34%	5.02%	4.88%
Red Flag Computation 9	16,754,097	0	595,610	885,538	1,098,906	1,078,578	1,496,772	1,542,328	1,385,308	1,089,090	1,519,449	1,940,868	1,837,814	1,720,478	563,359
	3.56%	0.00%	2.68%	2.22%	2.70%	2.62%	3.74%	3.62%	3.42%	2.84%	3.90%	4.94%	4.96%	4.85%	4.11%
Red Flag Computation 10	113,458,859	0	6,470,626	11,942,117	11,809,017	11,627,392	10,583,897	10,482,609	8,810,437	7,480,637	7,743,128	7,929,413	7,414,633	5,975,481	5,189,475
	24.14%	0.00%	29.14%	29.91%	28.98%	28.27%	26.46%	24.59%	21.74%	19.52%	19.87%	20.20%	20.03%	16.83%	37.84%
Red Flag Computation 11	3,073,676	0	33,277	175,803	129,317	138,893	172,488	318,529	291,200	206,736	166,958	482,191	333,897	442,353	182,037
	0.65%	0.00%	0.15%	0.44%	0.32%	0.34%	0.43%	0.75%	0.72%	0.54%	0.43%	1.23%	0.90%	1.25%	1.33%
Red Flag Computation 12	2,002,877	0	119,223	302,947	263,196	260,425	216,857	261,918	176,479	115,261	131,981	57,388	44,768	41,492	10,944
	0.43%	0.00%	0.54%	0.76%	0.65%	0.63%	0.54%	0.61%	0.44%	0.30%	0.34%	0.15%	0.12%	0.12%	0.08%
Red Flag Computation 13	227,550,602	0	11,261,043	21,623,227	19,756,533	20,167,938	19,139,908	20,268,470	17,947,628	17,268,879	18,585,862	19,754,351	18,479,687	17,600,326	5,696,749
	48.42%	0.00%	50.72%	54.16%	48.48%	49.03%	47.85%	47.55%	44.29%	45.06%	47.69%	50.32%	49.91%	49.58%	41.54%
Red Flag Computation 14	28,726,505	135	2,382,145	4,622,653	3,798,483	2,929,103	2,734,728	2,434,558	2,272,373	1,426,775	1,014,641	1,059,520	1,339,678	2,017,954	693,759
	6.11%	1.68%	10.73%	11.58%	9.32%	7.12%	6.84%	5.71%	5.61%	3.72%	2.60%	2.70%	3.62%	5.68%	5.06%

Notes

[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 142 of 155. PageID #: 637006

CONFIDENTIAL - SUBJECT TO PROTECTIVE ORDER

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - Flagged Multiple Times Nonrecurrent

Defendant	Publix	
Total # of Opioid Prescriptions	**752,246**	
Opioid Prescriptions Flagged - 2+ Methods	140,276	18.65%
Opioid Prescriptions Flagged - 3+ Methods	57,550	7.65%
Opioid Prescriptions Flagged - 4+ Methods	23,048	3.06%
Opioid Prescriptions Flagged - 5+ Methods	8,199	1.09%
Opioid Prescriptions Flagged - 6+ Methods	2,856	0.38%
Opioid Prescriptions Flagged - 7+ Methods	784	0.10%
Opioid Prescriptions Flagged - 8+ Methods	186	0.02%
Opioid Prescriptions Flagged - 9+ Methods	42	0.01%
Opioid Prescriptions Flagged - 10+ Methods	10	0.00%
Opioid Prescriptions Flagged - 11+ Methods	0	0.00%

Notes

[1] Defendant	Date Range
Publix	6/2006 - 5/2019

CONFIDENTIAL – SUBJECT TO PROTECTIVE ORDER

Summary of Publix Dispensing Red Flag Analysis

Cobb County, GA

Recurrent

	No of Prescriptions
All Prescriptions	1,204,308
Opioid Prescriptions	669,828

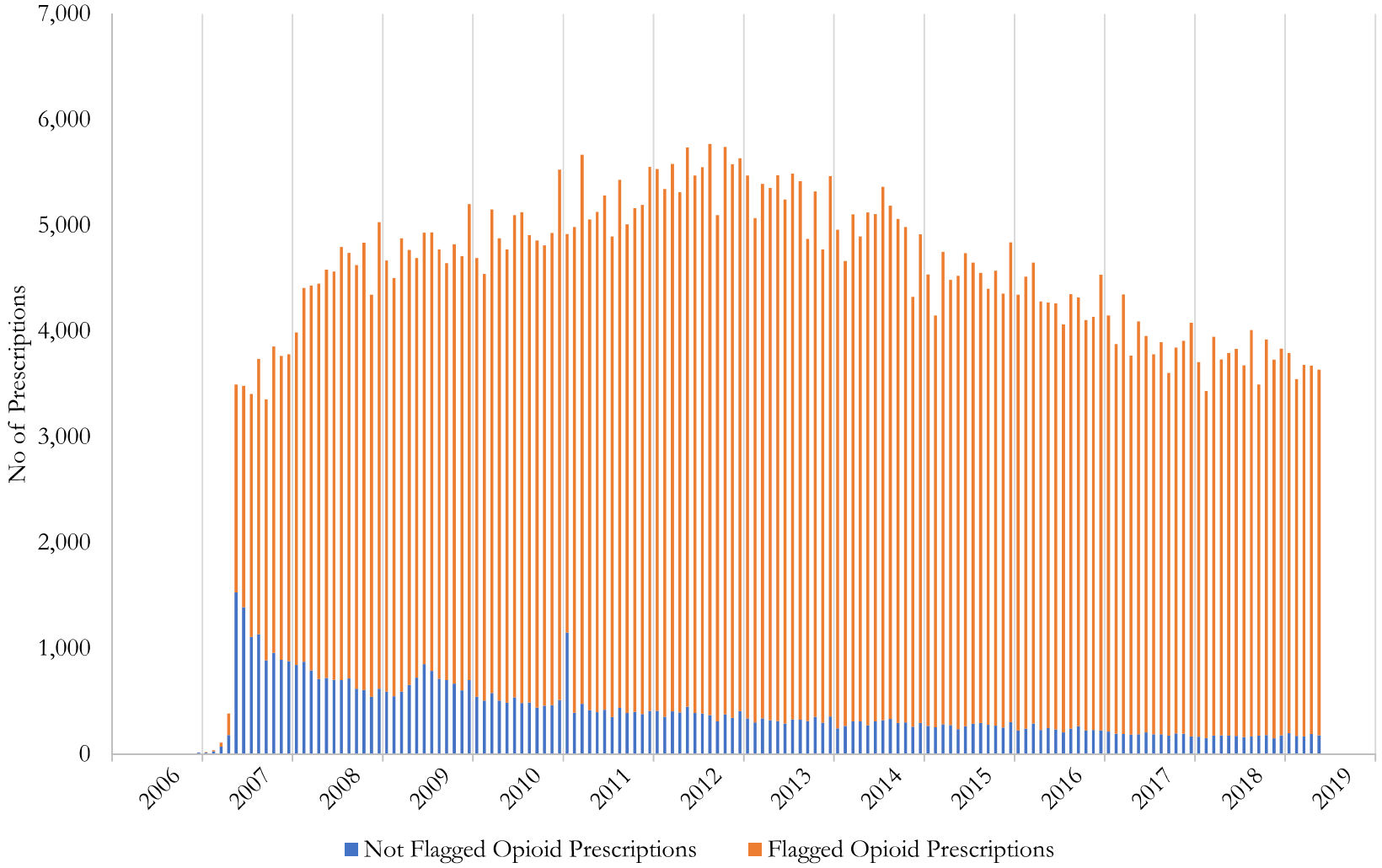
Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	609,268	91.0%
Red Flag Computation 1	22,673	3.4%
Red Flag Computation 2	498,368	74.4%
Red Flag Computation 3	180,514	26.9%
Red Flag Computation 4	56,550	8.4%
Red Flag Computation 5	71,565	10.7%
Red Flag Computation 6	164,498	24.6%
Red Flag Computation 7	184,014	27.5%
Red Flag Computation 8	392,963	58.7%
Red Flag Computation 9	63,040	9.4%
Red Flag Computation 10	240,674	35.9%
Red Flag Computation 11	119,712	17.9%
Red Flag Computation 12	36,261	5.4%
Red Flag Computation 13	127,416	19.0%
Red Flag Computation 14	167,140	25.0%

Notes:

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

Summary of Publix Dispensing Red Flag Analysis
Cobb County, GA
Recurrent



Data source: Dispensing Data.
Publix: 5/2006 - 5/2019.

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Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Recurrent
# of Prescriptions

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total # of Prescriptions of Rx	1,204,308	307	55,760	95,774	98,909	100,984	104,126	111,250	108,016	105,731	102,102	99,477	92,751	90,807	38,314
Total # of Prescriptions of Opioid Rx	669,828	21	29,429	54,793	57,510	59,288	62,279	66,356	63,350	59,684	54,542	51,833	47,302	45,111	18,330
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	609,268	5	20,361	46,342	49,377	53,291	56,662	61,770	59,487	56,170	51,285	48,981	45,021	43,090	17,426
	90.96%	23.81%	69.19%	84.58%	85.86%	89.88%	90.98%	93.09%	93.90%	94.11%	94.03%	94.50%	95.18%	95.52%	95.07%
Red Flag Computation 1	22,673	2	712	1,371	1,510	1,760	2,057	2,495	2,295	2,252	1,943	1,837	1,762	1,916	761
	3.38%	9.52%	2.42%	2.50%	2.63%	2.97%	3.30%	3.76%	3.62%	3.77%	3.56%	3.54%	3.73%	4.25%	4.15%
Red Flag Computation 2	498,368	1	9,313	30,244	34,634	40,585	45,381	52,503	51,272	49,031	45,689	44,000	40,539	39,216	15,960
	74.40%	4.76%	31.65%	55.20%	60.22%	68.45%	72.87%	79.12%	80.93%	82.15%	83.77%	84.89%	85.70%	86.93%	87.07%
Red Flag Computation 3	180,514	0	5,348	13,155	12,684	14,789	16,019	17,518	17,376	16,914	16,024	15,615	15,075	14,369	5,628
	26.95%	0.00%	18.17%	24.01%	22.06%	24.94%	25.72%	26.40%	27.43%	28.34%	29.38%	30.13%	31.87%	31.85%	30.70%
Red Flag Computation 4	56,550	0	787	3,085	2,890	2,722	4,366	5,625	5,934	5,819	5,611	5,588	5,935	5,857	2,331
	8.44%	0.00%	2.67%	5.63%	5.03%	4.59%	7.01%	8.48%	9.37%	9.75%	10.29%	10.78%	12.55%	12.98%	12.72%
Red Flag Computation 5	71,565	0	1,724	4,503	4,724	5,363	6,155	6,777	6,942	6,596	6,605	6,895	6,576	6,204	2,501
	10.68%	0.00%	5.86%	8.22%	8.21%	9.05%	9.88%	10.21%	10.96%	11.05%	12.11%	13.30%	13.90%	13.75%	13.64%
Red Flag Computation 6	164,498	0	4,080	10,830	11,707	12,214	12,785	16,082	16,299	16,080	15,076	14,869	14,459	14,363	5,654
	24.56%	0.00%	13.86%	19.77%	20.36%	20.60%	20.53%	24.24%	25.73%	26.94%	27.64%	28.69%	30.57%	31.84%	30.85%
Red Flag Computation 7	184,014	1	6,066	13,410	13,512	14,564	15,913	17,531	17,802	17,044	16,321	16,345	15,360	14,468	5,677
	27.47%	4.76%	20.61%	24.47%	23.50%	24.56%	25.55%	26.42%	28.10%	28.56%	29.92%	31.53%	32.47%	32.07%	30.97%
Red Flag Computation 8	392,963	1	9,036	25,768	28,305	32,279	34,715	40,052	39,441	37,953	35,597	34,284	31,944	31,046	12,542
	58.67%	4.76%	30.70%	47.03%	49.22%	54.44%	55.74%	60.36%	62.26%	63.59%	65.27%	66.14%	67.53%	68.82%	68.42%
Red Flag Computation 9	63,040	0	998	2,776	2,689	3,195	4,099	4,668	5,297	6,323	7,456	7,830	7,389	7,417	2,903
	9.41%	0.00%	3.39%	5.07%	4.68%	5.39%	6.58%	7.03%	8.36%	10.59%	13.67%	15.11%	15.62%	16.44%	15.84%
Red Flag Computation 10	240,674	0	6,189	14,647	15,449	18,794	20,108	23,810	23,420	22,601	22,421	22,022	21,052	21,193	8,968
	35.93%	0.00%	21.03%	26.73%	26.86%	31.70%	32.29%	35.88%	36.97%	37.87%	41.11%	42.49%	44.51%	46.98%	48.93%
Red Flag Computation 11	119,712	0	732	4,399	6,398	8,661	10,663	13,588	14,220	12,799	11,577	11,291	10,677	10,391	4,316
	17.87%	0.00%	2.49%	8.03%	11.13%	14.61%	17.12%	20.48%	22.45%	21.44%	21.23%	21.78%	22.57%	23.03%	23.55%
Red Flag Computation 12	36,261	0	632	1,985	2,327	2,866	3,240	3,982	4,056	3,853	3,460	3,196	2,941	2,651	1,072
	5.41%	0.00%	2.15%	3.62%	4.05%	4.83%	5.20%	6.00%	6.40%	6.46%	6.34%	6.17%	6.22%	5.88%	5.85%
Red Flag Computation 13	127,416	0	4,846	9,958	9,170	10,049	10,645	11,384	11,574	11,135	11,078	11,257	10,983	11,158	4,179
	19.02%	0.00%	16.47%	18.17%	15.95%	16.95%	17.09%	17.16%	18.27%	18.66%	20.31%	21.72%	23.22%	24.73%	22.80%
Red Flag Computation 14	167,140	1	5,484	14,215	14,572	14,895	16,673	17,199	16,683	14,654	12,571	11,768	10,911	12,388	5,126
	24.95%	4.76%	18.63%	25.94%	25.34%	25.12%	26.77%	25.92%	26.33%	24.55%	23.05%	22.70%	23.07%	27.46%	27.97%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

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Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Recurrent
Dosage Units

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Dosage Units of Rx	53,444,607	16,825	2,507,121	4,234,130	4,381,084	4,426,376	4,510,604	4,845,506	4,716,979	4,665,369	4,608,611	4,519,670	4,214,356	4,106,879	1,691,097
Total Dosage Units of Opioid Rx	28,442,730	1,250	1,261,630	2,286,675	2,396,877	2,422,276	2,510,203	2,718,706	2,621,670	2,524,056	2,419,903	2,325,607	2,134,926	2,022,125	796,826
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	26,853,969	310	993,395	2,062,229	2,177,301	2,264,005	2,365,771	2,604,119	2,523,412	2,433,371	2,338,932	2,254,350	2,080,029	1,977,636	779,109
	94.41%	24.80%	78.74%	90.18%	90.84%	93.47%	94.25%	95.79%	96.25%	96.41%	96.65%	96.94%	97.43%	97.80%	97.78%
Red Flag Computation 1	1,048,370	120	37,546	63,873	63,289	72,165	96,105	116,359	103,848	95,895	92,325	91,470	88,101	92,647	34,627
	3.69%	9.60%	2.98%	2.79%	2.64%	2.98%	3.83%	4.28%	3.96%	3.80%	3.82%	3.93%	4.13%	4.58%	4.35%
Red Flag Computation 2	21,921,313	100	475,521	1,333,421	1,497,341	1,696,948	1,874,690	2,200,813	2,172,957	2,128,953	2,092,426	2,033,933	1,878,179	1,816,151	719,880
	77.07%	8.00%	37.69%	58.31%	62.47%	70.06%	74.68%	80.95%	82.88%	84.35%	86.47%	87.46%	87.97%	89.81%	90.34%
Red Flag Computation 3	11,816,208	0	313,581	804,872	804,752	940,536	1,027,135	1,123,462	1,100,344	1,077,772	1,100,325	1,083,600	1,033,850	1,011,101	394,878
	41.54%	0.00%	24.86%	35.20%	33.58%	38.83%	40.92%	41.32%	41.97%	42.70%	45.47%	46.59%	48.43%	50.00%	49.56%
Red Flag Computation 4	3,936,063	0	42,321	175,664	181,987	176,992	288,605	388,431	401,489	396,212	424,742	416,850	429,378	439,495	173,897
	13.84%	0.00%	3.35%	7.68%	7.59%	7.31%	11.50%	14.29%	15.31%	15.70%	17.55%	17.92%	20.11%	21.73%	21.82%
Red Flag Computation 5	5,016,192	0	124,581	320,122	337,918	369,580	411,289	467,600	474,738	451,402	473,404	492,309	475,559	441,036	176,654
	17.64%	0.00%	9.87%	14.00%	14.10%	15.26%	16.38%	17.20%	18.11%	17.88%	19.56%	21.17%	22.28%	21.81%	22.17%
Red Flag Computation 6	11,445,133	0	283,001	743,423	813,792	847,212	877,637	1,114,424	1,106,445	1,095,953	1,083,626	1,059,136	1,023,830	1,007,079	389,575
	40.24%	0.00%	22.43%	32.51%	33.95%	34.98%	34.96%	40.99%	42.20%	43.42%	44.78%	45.54%	47.96%	49.80%	48.89%
Red Flag Computation 7	11,044,655	30	348,916	772,504	789,844	847,181	924,394	1,052,824	1,041,330	1,013,150	1,021,848	1,019,411	952,671	905,350	355,202
	38.83%	2.40%	27.66%	33.78%	32.95%	34.97%	36.83%	38.73%	39.72%	40.14%	42.23%	43.83%	44.62%	44.77%	44.58%
Red Flag Computation 8	20,121,277	30	535,703	1,392,917	1,499,205	1,630,717	1,703,279	1,957,462	1,928,238	1,883,081	1,866,763	1,803,302	1,669,452	1,614,472	636,656
	70.74%	2.40%	42.46%	60.91%	62.55%	67.32%	67.85%	72.00%	73.55%	74.61%	77.14%	77.54%	78.20%	79.84%	79.90%
Red Flag Computation 9	4,317,545	0	54,748	167,243	175,099	213,742	277,799	324,687	349,722	415,841	519,551	549,514	520,973	535,813	212,813
	15.18%	0.00%	4.34%	7.31%	7.31%	8.82%	11.07%	11.94%	13.34%	16.48%	21.47%	23.63%	24.40%	26.50%	26.71%
Red Flag Computation 10	15,558,632	0	441,835	1,007,929	1,076,783	1,207,864	1,242,226	1,461,972	1,431,234	1,419,750	1,468,857	1,447,843	1,381,464	1,398,007	572,868
	54.70%	0.00%	35.02%	44.08%	44.92%	49.86%	49.49%	53.77%	54.59%	56.25%	60.70%	62.26%	64.71%	69.14%	71.89%
Red Flag Computation 11	5,166,122	0	32,627	179,191	266,066	313,277	373,672	507,341	582,180	548,124	529,218	539,766	545,183	532,944	216,533
	18.16%	0.00%	2.59%	7.84%	11.10%	12.93%	14.89%	18.66%	22.21%	21.72%	21.87%	23.21%	25.54%	26.36%	27.17%
Red Flag Computation 12	2,704,578	0	42,822	137,648	180,451	217,647	238,366	289,623	289,326	280,233	269,061	242,104	224,749	209,127	83,421
	9.51%	0.00%	3.39%	6.02%	7.53%	8.99%	9.50%	10.65%	11.04%	11.10%	11.12%	10.41%	10.53%	10.34%	10.47%
Red Flag Computation 13	9,850,748	0	355,956	745,820	705,133	772,636	826,448	882,231	872,828	861,024	888,774	893,861	847,761	868,929	329,347
	34.63%	0.00%	28.21%	32.62%	29.42%	31.90%	32.92%	32.45%	33.29%	34.11%	36.73%	38.44%	39.71%	42.97%	41.33%
Red Flag Computation 14	7,216,472	60	224,732	577,068	594,872	595,483	662,700	718,686	683,142	621,335	582,151	557,746	533,241	610,796	254,460
	25.37%	4.80%	17.81%	25.24%	24.82%	24.58%	26.40%	26.43%	26.06%	24.62%	24.06%	23.98%	24.98%	30.21%	31.93%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

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Summary of Publix Dispensing Red Flag Analysis - by Year
Cobb County, GA
Recurrent
MME

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total MME of Rx	426,947,181	9,430	20,122,781	36,439,595	36,714,861	37,254,681	37,274,216	39,906,505	37,158,280	34,909,003	35,162,438	35,054,569	32,857,901	32,119,973	11,962,948
Total MME of Opioid Rx	426,947,181	9,430	20,122,781	36,439,595	36,714,861	37,254,681	37,274,216	39,906,505	37,158,280	34,909,003	35,162,438	35,054,569	32,857,901	32,119,973	11,962,948
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	414,479,209	2,340	17,868,249	34,663,635	34,945,164	35,989,973	36,194,738	39,047,569	36,427,033	34,230,281	34,559,524	34,495,338	32,428,580	31,787,589	11,839,197
	97.08%	24.81%	88.80%	95.13%	95.18%	96.61%	97.10%	97.85%	98.03%	98.06%	98.29%	98.40%	98.69%	98.97%	98.97%
Red Flag Computation 1	17,306,053	1,200	858,499	1,102,336	996,590	1,225,607	1,880,864	1,966,008	1,617,884	1,346,219	1,406,775	1,421,990	1,359,338	1,609,669	513,076
	4.05%	12.73%	4.27%	3.03%	2.71%	3.29%	5.05%	4.93%	4.35%	3.86%	4.00%	4.06%	4.14%	5.01%	4.29%
Red Flag Computation 2	342,000,871	450	8,839,156	23,496,059	24,638,062	27,319,720	29,212,922	33,666,634	31,911,494	30,317,477	31,345,070	31,277,960	29,382,725	29,520,006	11,073,136
	80.10%	4.77%	43.93%	64.48%	67.11%	73.33%	78.37%	84.36%	85.88%	86.85%	89.14%	89.23%	89.42%	91.91%	92.56%
Red Flag Computation 3	230,460,612	0	7,313,740	17,929,349	16,358,194	19,264,443	20,629,809	22,090,719	20,424,935	18,814,260	20,746,569	20,830,825	19,876,867	19,169,615	7,011,287
	53.98%	0.00%	36.35%	49.20%	44.55%	51.71%	55.35%	55.36%	54.97%	53.90%	59.00%	59.42%	60.49%	59.68%	58.61%
Red Flag Computation 4	93,489,416	0	1,021,346	4,075,768	3,847,228	3,986,925	7,309,274	9,906,832	10,009,496	8,953,772	9,999,923	9,820,900	10,340,505	10,370,713	3,846,735
	21.90%	0.00%	5.08%	11.18%	10.48%	10.70%	19.61%	24.83%	26.94%	25.65%	28.44%	28.02%	31.47%	32.29%	32.16%
Red Flag Computation 5	100,889,113	0	2,285,358	6,640,859	6,849,759	8,284,561	9,285,185	10,349,996	10,042,789	8,553,433	9,423,569	9,495,876	8,783,800	7,923,395	2,970,533
	23.63%	0.00%	11.36%	18.22%	18.66%	22.24%	24.91%	25.94%	27.03%	24.50%	26.80%	27.09%	26.73%	24.67%	24.83%
Red Flag Computation 6	216,650,631	0	6,088,175	15,970,383	16,482,938	17,820,166	18,209,913	21,576,835	20,411,947	18,677,996	19,617,293	19,096,063	18,125,633	18,023,674	6,549,617
	50.74%	0.00%	30.26%	43.83%	44.89%	47.83%	48.85%	54.07%	54.93%	53.50%	55.79%	54.48%	55.16%	56.11%	54.75%
Red Flag Computation 7	203,564,369	150	6,685,014	15,015,118	15,469,122	16,889,578	17,775,169	20,355,152	19,282,798	17,083,485	17,982,743	18,065,933	17,037,482	15,959,599	5,963,028
	47.68%	1.59%	33.22%	41.21%	42.13%	45.34%	47.69%	51.01%	51.89%	48.94%	51.14%	51.54%	51.85%	49.69%	49.85%
Red Flag Computation 8	334,095,115	150	10,491,959	25,900,704	26,588,538	28,984,909	28,993,112	32,393,706	30,184,347	28,260,473	29,391,259	29,202,243	27,065,352	26,711,082	9,927,281
	78.25%	1.59%	52.14%	71.08%	72.42%	77.80%	77.78%	81.17%	81.23%	80.95%	83.59%	83.31%	82.37%	83.16%	82.98%
Red Flag Computation 9	89,466,667	0	865,212	3,139,521	3,583,057	4,995,223	6,383,412	6,831,451	7,019,217	7,742,536	10,557,899	11,399,926	10,898,708	11,759,210	4,291,298
	20.95%	0.00%	4.30%	8.62%	9.76%	13.41%	17.13%	17.12%	18.89%	22.18%	30.03%	32.52%	33.17%	36.61%	35.87%
Red Flag Computation 10	311,888,622	0	11,892,245	24,751,265	24,765,348	26,433,859	26,326,041	28,992,490	26,674,656	25,220,896	26,767,678	27,208,215	26,105,691	26,595,975	10,154,265
	73.05%	0.00%	59.10%	67.92%	67.45%	70.95%	70.63%	72.65%	71.79%	72.25%	76.13%	77.62%	79.45%	82.80%	84.88%
Red Flag Computation 11	81,030,104	0	556,394	3,245,525	4,390,611	4,469,182	4,976,909	7,181,804	9,012,875	8,211,392	8,355,972	9,006,614	9,279,387	8,980,557	3,362,883
	18.98%	0.00%	2.76%	8.91%	11.96%	12.00%	13.35%	18.00%	24.26%	23.52%	23.76%	25.69%	28.24%	27.96%	28.11%
Red Flag Computation 12	48,671,038	0	474,395	1,855,953	2,648,867	3,506,121	4,285,401	5,721,310	5,315,364	4,876,186	5,232,548	4,967,682	4,282,714	3,948,806	1,555,692
	11.40%	0.00%	2.36%	5.09%	7.21%	9.41%	11.50%	14.34%	14.30%	13.97%	14.88%	14.17%	13.03%	12.29%	13.00%
Red Flag Computation 13	238,831,666	0	9,997,421	20,176,253	18,868,340	20,132,802	20,638,052	21,503,888	19,911,206	18,938,788	20,544,210	21,116,633	19,952,190	19,961,334	7,090,550
	55.94%	0.00%	49.68%	55.37%	51.39%	54.04%	55.37%	53.89%	53.58%	54.25%	58.43%	60.24%	60.72%	62.15%	59.27%
Red Flag Computation 14	121,329,557	540	3,457,282	9,410,396	9,498,120	9,628,600	11,701,601	12,642,186	11,484,283	9,300,678	9,369,852	9,545,323	9,542,060	11,357,839	4,390,797
	28.42%	5.73%	17.18%	25.82%	25.87%	25.85%	31.39%	31.68%	30.91%	26.64%	26.65%	27.23%	29.04%	35.36%	36.70%

Notes

[1] Defendant: Publix

Date Range: 5/2006 - 5/2019

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CONFIDENTIAL - SUBJECT TO PROTECTIVE ORDER

Summary of Opioid Prescriptions - Flagged Multiple Times
Cobb County, GA
Recurrent

Defendant	Publix	
Total # of Opioid Prescriptions	**669,828**	
Opioid Prescriptions Flagged - 2+ Methods	494,509	73.83%
Opioid Prescriptions Flagged - 3+ Methods	371,581	55.47%
Opioid Prescriptions Flagged - 4+ Methods	266,007	39.71%
Opioid Prescriptions Flagged - 5+ Methods	194,178	28.99%
Opioid Prescriptions Flagged - 6+ Methods	142,480	21.27%
Opioid Prescriptions Flagged - 7+ Methods	100,982	15.08%
Opioid Prescriptions Flagged - 8+ Methods	67,912	10.14%
Opioid Prescriptions Flagged - 9+ Methods	41,596	6.21%
Opioid Prescriptions Flagged - 10+ Methods	22,458	3.35%
Opioid Prescriptions Flagged - 11+ Methods	10,089	1.51%
Opioid Prescriptions Flagged - 12+ Methods	3,724	0.56%
Opioid Prescriptions Flagged - 13+ Methods	603	0.09%
Opioid Prescriptions Flagged - 14+ Methods	1	0.00%

Notes

[1] Defendant	Date Range
Publix	5/2006 - 5/2019

CONFIDENTIAL – SUBJECT TO PROTECTIVE ORDER

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA

Publix

Recurrent

	No of Prescriptions
All Prescriptions	1,368,643
Opioid Prescriptions	752,246

Red Flags	Flagged Opioid Prescriptions	%
Flagged for Any of the 14 Red Flag Computations	723,465	96.2%
Red Flag Computation 1	21,310	2.8%
Red Flag Computation 2	676,987	90.0%
Red Flag Computation 3	211,093	28.1%
Red Flag Computation 4	79,674	10.6%
Red Flag Computation 5	83,817	11.1%
Red Flag Computation 6	228,515	30.4%
Red Flag Computation 7	217,018	28.8%
Red Flag Computation 8	520,010	69.1%
Red Flag Computation 9	72,432	9.6%
Red Flag Computation 10	313,890	41.7%
Red Flag Computation 11	216,266	28.7%
Red Flag Computation 12	42,361	5.6%
Red Flag Computation 13	144,321	19.2%
Red Flag Computation 14	193,231	25.7%

Notes:

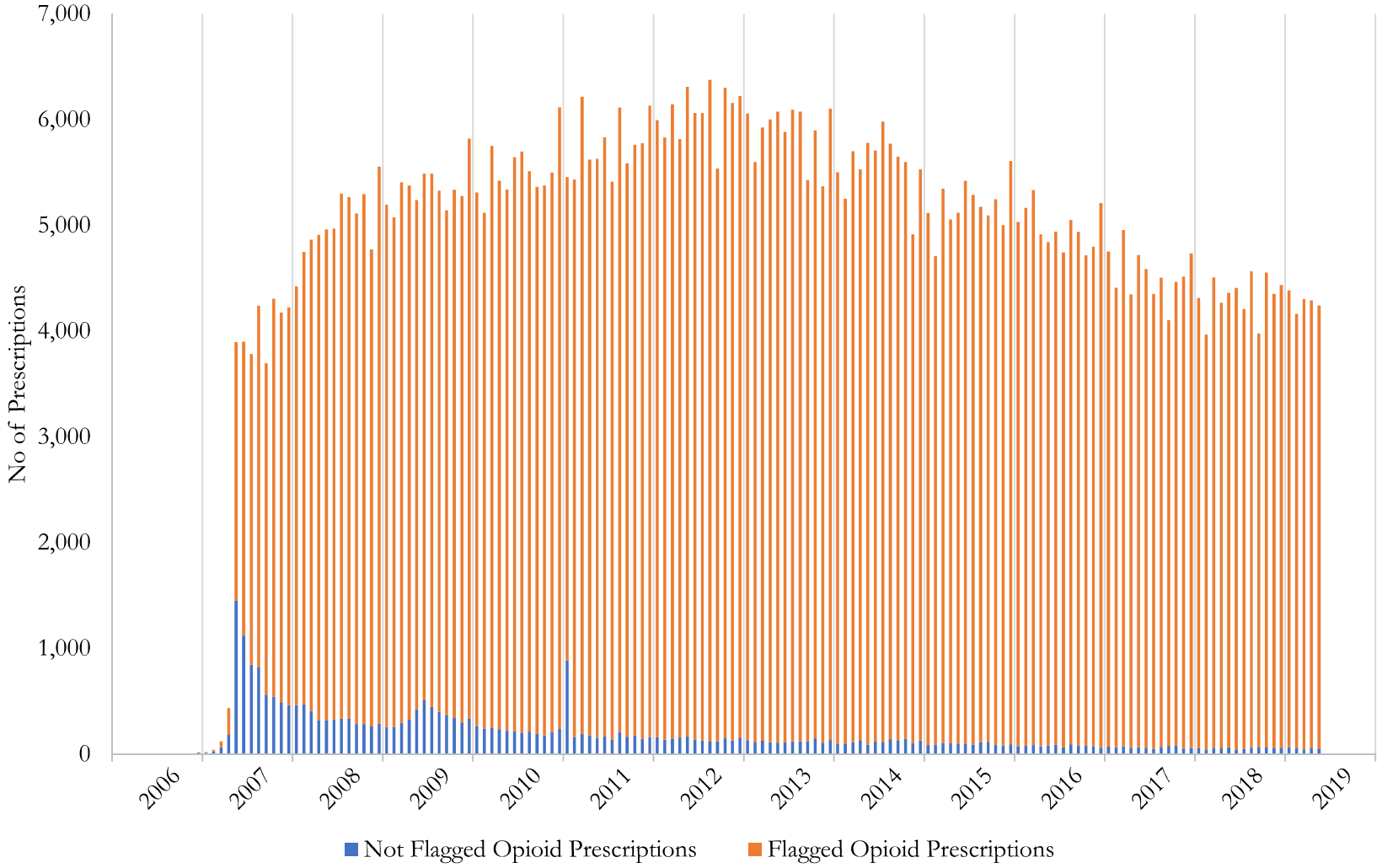
[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA

Publix

Recurrent



Data source: Dispensing Data.
Publix: 6/2006 - 5/2019.

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 151 of 155. PageID #: 637015

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year

Publix

Recurrent

# of Prescriptions

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total # of Prescriptions of Rx	1,368,643	340	61,978	105,076	110,513	113,411	116,105	123,717	121,694	119,957	118,282	116,481	108,910	106,753	45,426
Total # of Prescriptions of Opioid Rx	752,246	20	32,838	60,184	64,179	66,157	68,976	72,822	70,516	66,929	62,183	59,688	54,455	51,912	21,387
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	723,465	3	26,253	56,086	59,914	63,498	66,238	71,116	69,051	65,519	61,032	58,755	53,667	51,229	21,104
	96.17%	15.00%	79.95%	93.19%	93.35%	95.98%	96.03%	97.66%	97.92%	97.89%	98.15%	98.44%	98.55%	98.68%	98.68%
Red Flag Computation 1	21,310	0	317	785	1,157	1,453	1,531	1,934	2,151	2,226	2,190	2,157	2,022	2,423	964
	2.83%	0.00%	0.97%	1.30%	1.80%	2.20%	2.22%	2.66%	3.05%	3.33%	3.52%	3.61%	3.71%	4.67%	4.51%
Red Flag Computation 2	676,987	1	18,973	48,616	52,563	57,680	61,447	68,035	66,566	63,252	59,308	57,273	52,512	50,134	20,627
	90.00%	5.00%	57.78%	80.78%	81.90%	87.19%	89.08%	93.43%	94.40%	94.51%	95.38%	95.95%	96.43%	96.57%	96.45%
Red Flag Computation 3	211,093	0	5,931	14,850	15,295	17,927	17,829	19,754	20,102	19,604	18,637	18,773	18,071	17,378	6,942
	28.06%	0.00%	18.06%	24.67%	23.83%	27.10%	25.85%	27.13%	28.51%	29.29%	29.97%	31.45%	33.19%	33.48%	32.46%
Red Flag Computation 4	79,674	0	1,087	3,979	5,138	5,917	5,658	7,433	7,862	7,758	7,542	7,879	8,019	8,022	3,380
	10.59%	0.00%	3.31%	6.61%	8.01%	8.94%	8.20%	10.21%	11.15%	11.59%	12.13%	13.20%	14.73%	15.45%	15.80%
Red Flag Computation 5	83,817	0	2,039	4,936	5,661	6,792	6,794	7,656	7,810	7,623	7,885	8,090	7,907	7,502	3,122
	11.14%	0.00%	6.21%	8.20%	8.82%	10.27%	9.85%	10.51%	11.08%	11.39%	12.68%	13.55%	14.52%	14.45%	14.60%
Red Flag Computation 6	228,515	0	5,748	14,710	15,827	17,404	17,830	21,908	22,078	21,697	20,794	21,367	20,523	20,445	8,184
	30.38%	0.00%	17.50%	24.44%	24.66%	26.31%	25.85%	30.08%	31.31%	32.42%	33.44%	35.80%	37.69%	39.38%	38.27%
Red Flag Computation 7	217,018	1	7,031	15,006	16,609	18,404	17,970	19,759	20,344	19,932	19,445	19,687	18,419	17,360	7,051
	28.85%	5.00%	21.41%	24.93%	25.88%	27.82%	26.05%	27.13%	28.85%	29.78%	31.27%	32.98%	33.82%	33.44%	32.97%
Red Flag Computation 8	520,010	1	12,293	32,988	36,850	42,593	45,445	51,921	51,527	49,824	47,736	46,579	43,354	41,788	17,111
	69.13%	5.00%	37.44%	54.81%	57.42%	64.38%	65.89%	71.30%	73.07%	74.44%	76.77%	78.04%	79.61%	80.50%	80.01%
Red Flag Computation 9	72,432	0	1,241	3,181	3,232	4,054	4,609	5,025	5,690	6,875	8,355	8,972	8,672	8,925	3,601
	9.63%	0.00%	3.78%	5.29%	5.04%	6.13%	6.68%	6.90%	8.07%	10.27%	13.44%	15.03%	15.93%	17.19%	16.84%
Red Flag Computation 10	313,890	0	7,747	19,072	20,348	24,091	25,228	30,216	30,502	29,759	29,711	29,296	28,078	27,766	12,076
	41.73%	0.00%	23.59%	31.69%	31.71%	36.41%	36.58%	41.49%	43.26%	44.46%	47.78%	49.08%	51.56%	53.49%	56.46%
Red Flag Computation 11	216,266	0	1,366	9,104	11,948	15,255	17,820	22,424	23,054	21,882	20,892	21,453	20,516	21,343	9,209
	28.75%	0.00%	4.16%	15.13%	18.62%	23.06%	25.84%	30.79%	32.69%	32.69%	33.60%	35.94%	37.68%	41.11%	43.06%
Red Flag Computation 12	42,361	0	676	2,269	2,611	3,296	3,746	4,454	4,685	4,504	4,096	3,887	3,546	3,274	1,317
	5.63%	0.00%	2.06%	3.77%	4.07%	4.98%	5.43%	6.12%	6.64%	6.73%	6.59%	6.51%	6.51%	6.31%	6.16%
Red Flag Computation 13	144,321	0	5,398	11,245	10,385	11,393	11,651	12,539	12,966	12,590	12,707	13,063	12,709	12,801	4,874
	19.19%	0.00%	16.44%	18.68%	16.18%	17.22%	16.89%	17.22%	18.39%	18.81%	20.43%	21.89%	23.34%	24.66%	22.79%
Red Flag Computation 14	193,231	1	5,896	15,332	16,479	17,907	17,973	19,010	19,116	17,206	15,102	14,395	13,343	15,077	6,394
	25.69%	5.00%	17.95%	25.48%	25.68%	27.07%	26.06%	26.10%	27.11%	25.71%	24.29%	24.12%	24.50%	29.04%	29.90%

Notes

[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

Case: 1:17-md-02804-DAP Doc #: 5437-35 Filed: 05/13/24 152 of 155. PageID #: 637016

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year
Publix
Recurrent
Dosage Units

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Dosage Units of Rx	60,391,886	18,955	2,768,882	4,627,876	4,873,777	4,951,025	4,985,260	5,338,257	5,275,136	5,265,554	5,310,478	5,251,706	4,916,788	4,795,773	2,012,419
Total Dosage Units of Opioid Rx	31,789,759	1,130	1,405,959	2,514,460	2,669,391	2,705,871	2,754,670	2,952,836	2,896,990	2,807,332	2,746,759	2,660,896	2,436,064	2,303,416	933,985
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	31,073,231	160	1,221,446	2,418,609	2,563,142	2,639,813	2,686,708	2,913,537	2,861,154	2,773,294	2,718,730	2,639,454	2,419,187	2,288,953	929,044
	97.75%	14.16%	86.88%	96.19%	96.02%	97.56%	97.53%	98.67%	98.76%	98.79%	98.98%	99.19%	99.31%	99.37%	99.47%
Red Flag Computation 1	1,085,564	0	16,996	33,941	53,357	61,409	72,210	96,786	106,587	108,497	119,493	118,599	107,413	134,691	55,585
	3.41%	0.00%	1.21%	1.35%	2.00%	2.27%	2.62%	3.28%	3.68%	3.86%	4.35%	4.46%	4.41%	5.85%	5.95%
Red Flag Computation 2	29,139,117	100	911,089	2,117,096	2,243,980	2,386,287	2,485,827	2,779,261	2,761,801	2,686,192	2,650,387	2,582,404	2,374,960	2,247,697	912,036
	91.66%	8.85%	64.80%	84.20%	84.06%	88.19%	90.24%	94.12%	95.33%	95.68%	96.49%	97.05%	97.49%	97.58%	97.65%
Red Flag Computation 3	13,677,838	0	348,868	903,702	949,356	1,118,572	1,136,107	1,255,948	1,271,128	1,234,183	1,267,232	1,280,650	1,224,639	1,205,748	481,705
	43.03%	0.00%	24.81%	35.94%	35.56%	41.34%	41.24%	42.53%	43.88%	43.96%	46.14%	48.13%	50.27%	52.35%	51.58%
Red Flag Computation 4	5,439,855	0	60,147	231,334	316,225	373,062	374,267	514,287	532,398	521,152	552,996	571,462	567,014	579,113	246,398
	17.11%	0.00%	4.28%	9.20%	11.85%	13.79%	13.59%	17.42%	18.38%	18.56%	20.13%	21.48%	23.28%	25.14%	26.38%
Red Flag Computation 5	5,868,484	0	143,265	347,440	394,371	453,625	460,719	527,512	534,519	526,671	572,406	579,701	570,920	534,612	222,723
	18.46%	0.00%	10.19%	13.82%	14.77%	16.76%	16.73%	17.86%	18.45%	18.76%	20.84%	21.79%	23.44%	23.21%	23.85%
Red Flag Computation 6	15,721,699	0	412,826	1,034,168	1,102,981	1,195,447	1,206,488	1,477,274	1,467,776	1,444,015	1,482,438	1,498,932	1,421,592	1,412,742	565,020
	49.46%	0.00%	29.36%	41.13%	41.32%	44.18%	43.80%	50.03%	50.67%	51.44%	53.97%	56.33%	58.36%	61.33%	60.50%
Red Flag Computation 7	12,871,173	30	402,804	866,287	951,733	1,049,016	1,034,838	1,163,253	1,174,834	1,174,133	1,205,867	1,209,299	1,128,836	1,073,250	436,993
	40.49%	2.65%	28.65%	34.45%	35.65%	38.77%	37.57%	39.39%	40.55%	41.82%	43.90%	45.45%	46.34%	46.59%	46.79%
Red Flag Computation 8	25,452,007	30	722,527	1,751,619	1,900,431	2,078,677	2,132,114	2,416,394	2,396,157	2,353,374	2,366,297	2,309,912	2,133,927	2,059,206	831,342
	80.06%	2.65%	51.39%	69.66%	71.19%	76.82%	77.40%	81.83%	82.71%	83.83%	86.15%	86.81%	87.60%	89.40%	89.01%
Red Flag Computation 9	4,896,214	0	66,530	186,039	207,218	271,516	303,530	347,223	370,858	442,683	568,245	621,120	608,078	637,791	265,383
	15.40%	0.00%	4.73%	7.40%	7.76%	10.03%	11.02%	11.76%	12.80%	15.77%	20.69%	23.34%	24.96%	27.69%	28.41%
Red Flag Computation 10	19,524,790	0	535,907	1,250,776	1,360,668	1,504,346	1,517,848	1,796,444	1,815,565	1,808,871	1,885,775	1,839,478	1,744,043	1,731,348	733,721
	61.42%	0.00%	38.12%	49.74%	50.97%	55.60%	55.10%	60.84%	62.67%	64.43%	68.65%	69.13%	71.59%	75.16%	78.56%
Red Flag Computation 11	10,021,730	0	70,155	455,008	544,968	626,386	692,846	907,328	988,257	964,353	996,842	1,074,788	1,077,927	1,137,853	485,019
	31.53%	0.00%	4.99%	18.10%	20.42%	23.15%	25.15%	30.73%	34.11%	34.35%	36.29%	40.39%	44.25%	49.40%	51.93%
Red Flag Computation 12	3,226,477	0	46,385	160,451	203,306	250,254	281,582	330,056	343,663	336,985	324,717	303,653	279,107	261,181	105,137
	10.15%	0.00%	3.30%	6.38%	7.62%	9.25%	10.22%	11.18%	11.86%	12.00%	11.82%	11.41%	11.46%	11.34%	11.26%
Red Flag Computation 13	11,189,000	0	397,124	842,387	805,377	883,726	912,703	977,122	987,894	973,302	1,020,723	1,033,401	979,907	991,113	384,221
	35.20%	0.00%	28.25%	33.50%	30.17%	32.66%	33.13%	33.09%	34.10%	34.67%	37.16%	38.84%	40.23%	43.03%	41.14%
Red Flag Computation 14	8,317,096	30	239,154	629,164	670,393	721,051	699,737	774,294	771,610	722,389	699,597	682,474	649,063	741,310	316,830
	26.16%	2.65%	17.01%	25.02%	25.11%	26.65%	25.40%	26.22%	26.63%	25.73%	25.47%	25.65%	26.64%	32.18%	33.92%

Notes

[1] Defendant
Publix

Date Range
6/2006 - 5/2019

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Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - by Year

Publix

Recurrent

MME

	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total MME of Rx	469,961,290	8,050	22,204,552	39,925,055	40,751,931	41,132,826	39,999,522	42,624,727	40,524,167	38,320,788	38,970,038	39,260,335	37,026,140	35,500,690	13,712,469
Total MME of Opioid Rx	469,961,290	8,050	22,204,552	39,925,055	40,751,931	41,132,826	39,999,522	42,624,727	40,524,167	38,320,788	38,970,038	39,260,335	37,026,140	35,500,690	13,712,469
Opioid Prescriptions Flagged for															
Any of the 14 Red Flag Computations	464,458,119	735	20,701,388	39,210,569	39,887,462	40,603,077	39,502,928	42,347,611	40,255,955	38,079,838	38,771,962	39,106,621	36,910,526	35,400,322	13,679,125
	98.83%	9.13%	93.23%	98.21%	97.88%	98.71%	98.76%	99.35%	99.34%	99.37%	99.49%	99.61%	99.69%	99.72%	99.76%
Red Flag Computation 1	17,371,623	0	252,815	489,807	885,959	884,792	1,246,409	1,667,272	1,689,313	1,515,122	1,820,256	1,922,533	1,809,731	2,268,320	919,296
	3.70%	0.00%	1.14%	1.23%	2.17%	2.15%	3.12%	3.91%	4.17%	3.95%	4.67%	4.90%	4.89%	6.39%	6.70%
Red Flag Computation 2	438,438,833	450	15,844,704	35,132,513	35,496,166	36,816,024	36,956,625	40,648,807	39,099,397	37,212,388	38,029,532	38,373,929	36,388,751	34,957,537	13,482,012
	93.29%	5.59%	71.36%	88.00%	87.10%	89.51%	92.39%	95.36%	96.48%	97.11%	97.59%	97.74%	98.28%	98.47%	98.32%
Red Flag Computation 3	261,963,510	0	8,066,223	20,191,739	19,618,118	22,350,371	22,481,033	24,050,471	23,181,987	21,500,082	23,082,167	23,894,433	23,015,535	22,150,514	8,380,839
	55.74%	0.00%	36.33%	50.57%	48.14%	54.34%	56.20%	56.42%	57.21%	56.11%	59.23%	60.86%	62.16%	62.39%	61.12%
Red Flag Computation 4	122,183,090	0	1,269,574	5,091,802	6,665,704	7,864,397	9,253,420	12,523,033	12,517,038	11,240,839	12,167,850	12,683,151	12,858,150	12,836,151	5,211,983
	26.00%	0.00%	5.72%	12.75%	16.36%	19.12%	23.13%	29.38%	30.89%	29.33%	31.22%	32.31%	34.73%	36.16%	38.01%
Red Flag Computation 5	114,900,808	0	2,660,520	7,172,476	7,995,456	9,646,350	10,244,001	11,427,931	11,048,438	9,626,897	10,799,625	10,805,853	10,446,502	9,374,244	3,652,517
	24.45%	0.00%	11.98%	17.96%	19.62%	23.45%	25.61%	26.81%	27.26%	25.12%	27.71%	27.52%	28.21%	26.41%	26.64%
Red Flag Computation 6	293,247,893	0	8,705,479	21,972,904	22,606,036	24,725,128	24,124,229	27,534,578	26,205,985	24,465,334	25,998,241	26,701,886	25,503,909	25,160,882	9,543,303
	62.40%	0.00%	39.21%	55.04%	55.47%	60.11%	60.31%	64.60%	64.67%	63.84%	66.71%	68.01%	68.88%	70.87%	69.60%
Red Flag Computation 7	230,544,555	150	7,730,832	16,671,802	18,106,670	19,831,154	19,264,242	21,761,399	20,991,330	19,362,743	20,675,455	20,808,723	19,742,178	18,449,630	7,148,249
	49.06%	1.86%	34.82%	41.76%	44.43%	48.21%	48.16%	51.05%	51.80%	50.53%	53.05%	53.00%	53.32%	51.97%	52.13%
Red Flag Computation 8	406,643,000	150	14,012,980	32,268,991	32,888,638	35,125,237	34,365,049	37,918,627	36,006,508	34,156,867	35,401,458	35,568,920	33,693,222	32,663,512	12,572,841
	86.53%	1.86%	63.11%	80.82%	80.70%	85.39%	85.91%	88.96%	88.85%	89.13%	90.84%	90.60%	91.00%	92.01%	91.69%
Red Flag Computation 9	100,457,316	0	1,367,829	3,612,405	4,327,258	5,933,786	6,838,304	7,207,865	7,275,322	8,196,456	11,490,679	12,749,758	12,444,879	13,682,002	5,330,774
	21.38%	0.00%	6.16%	9.05%	10.62%	14.43%	17.10%	16.91%	17.95%	21.39%	29.49%	32.47%	33.61%	38.54%	38.88%
Red Flag Computation 10	366,918,708	0	13,788,736	28,913,233	29,457,592	30,868,034	29,672,257	33,261,693	31,762,679	30,340,198	32,026,774	32,353,622	31,442,371	30,845,386	12,186,132
	78.07%	0.00%	62.10%	72.42%	72.29%	75.04%	74.18%	78.03%	78.38%	79.17%	82.18%	82.41%	84.92%	86.89%	88.87%
Red Flag Computation 11	162,799,336	0	1,551,164	9,370,482	9,403,147	10,102,141	10,383,926	14,046,635	15,491,661	14,683,059	15,159,416	17,290,348	18,293,209	19,403,248	7,620,902
	34.64%	0.00%	6.99%	23.47%	23.07%	24.56%	25.96%	32.95%	38.23%	38.32%	38.90%	44.04%	49.41%	54.66%	55.58%
Red Flag Computation 12	58,158,331	0	525,655	2,313,164	3,089,965	4,067,367	5,186,589	6,522,599	6,271,063	5,793,002	6,202,888	6,060,663	5,280,653	4,916,173	1,928,551
	12.38%	0.00%	2.37%	5.79%	7.58%	9.89%	12.97%	15.30%	15.47%	15.12%	15.92%	15.44%	14.26%	13.85%	14.06%
Red Flag Computation 13	266,274,778	0	11,280,278	22,684,514	21,411,882	22,361,553	22,390,701	23,425,726	22,136,701	21,252,354	22,716,186	23,622,578	22,694,108	22,217,984	8,080,215
	56.66%	0.00%	50.80%	56.82%	52.54%	54.36%	55.98%	54.96%	54.63%	55.46%	58.29%	60.17%	61.29%	62.58%	58.93%
Red Flag Computation 14	135,917,865	135	3,672,822	10,388,533	10,855,463	11,592,786	11,888,785	13,005,798	12,481,239	10,452,640	10,857,798	11,271,920	11,043,224	13,138,950	5,267,774
	28.92%	1.68%	16.54%	26.02%	26.64%	28.18%	29.72%	30.51%	30.80%	27.28%	27.86%	28.71%	29.83%	37.01%	38.42%

Notes

[1] Defendant: Publix

Date Range: 6/2006 - 5/2019

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CONFIDENTIAL - SUBJECT TO PROTECTIVE ORDER

Red Flag Analysis Summary on Prescriptions Dispensed to Residents of Cobb County, GA - Flagged Multiple Times
Recurrent

Defendant	Publix	
Total # of Opioid Prescriptions	**752,246**	
Opioid Prescriptions Flagged - 2+ Methods	625,822	83.19%
Opioid Prescriptions Flagged - 3+ Methods	493,644	65.62%
Opioid Prescriptions Flagged - 4+ Methods	359,119	47.74%
Opioid Prescriptions Flagged - 5+ Methods	260,813	34.67%
Opioid Prescriptions Flagged - 6+ Methods	193,140	25.68%
Opioid Prescriptions Flagged - 7+ Methods	140,853	18.72%
Opioid Prescriptions Flagged - 8+ Methods	98,748	13.13%
Opioid Prescriptions Flagged - 9+ Methods	63,284	8.41%
Opioid Prescriptions Flagged - 10+ Methods	36,413	4.84%
Opioid Prescriptions Flagged - 11+ Methods	17,739	2.36%
Opioid Prescriptions Flagged - 12+ Methods	6,583	0.88%
Opioid Prescriptions Flagged - 13+ Methods	1,207	0.16%
Opioid Prescriptions Flagged - 14+ Methods	95	0.01%

Notes

[1] Defendant	Date Range
Publix	6/2006 - 5/2019